CPI Ducking Additives Issue

ndustry's turn-cheek 'defense'
veakens public confidence — page 22

Containerization

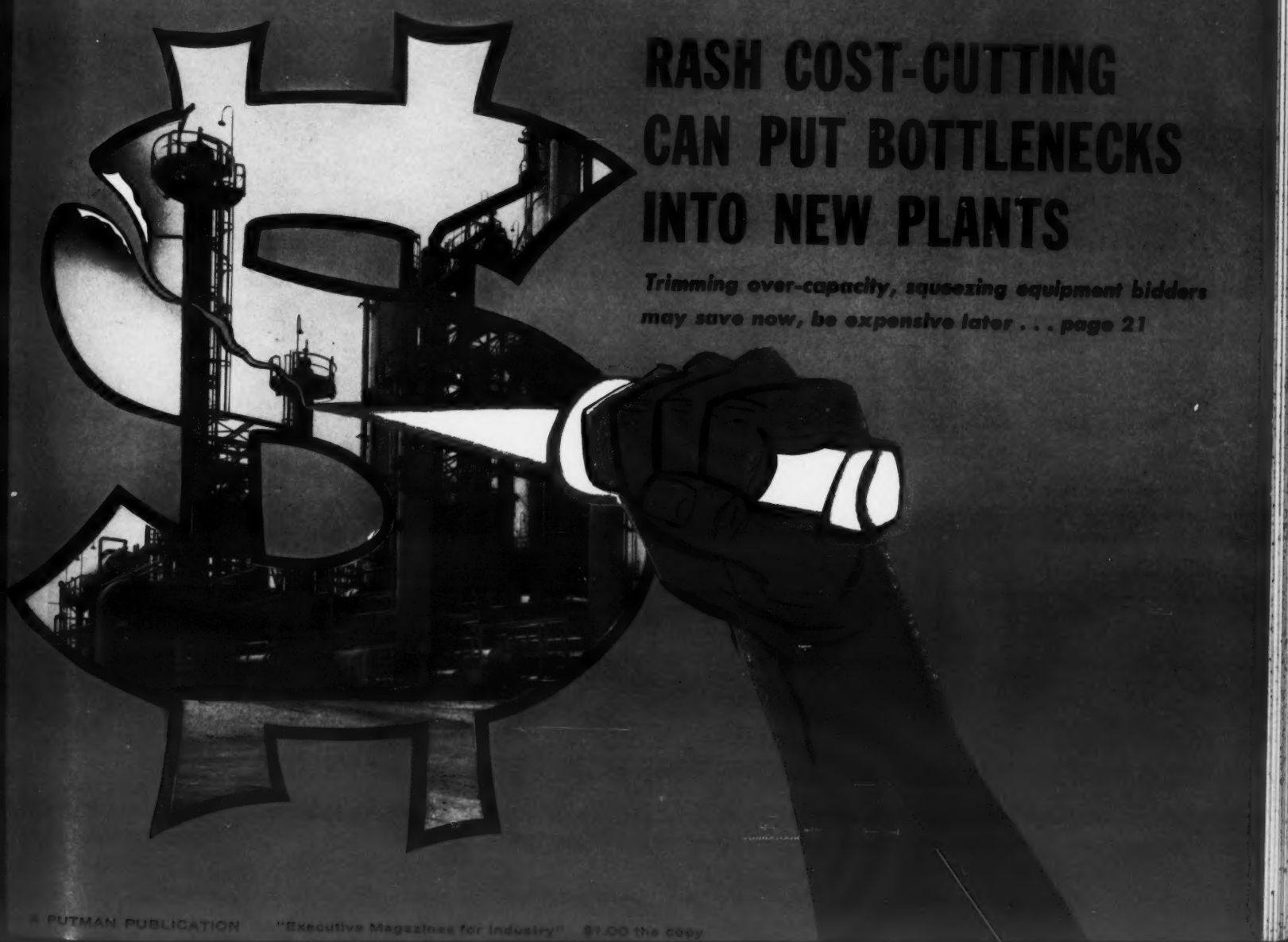
Shippers trim fat from
freight budgets — page 28

Feature section on Handling,
Packaging & Shipping — page 27

MAY 1960

CHEMICAL PROCESSING

PROCESS DYNAMICS



RASH COST-CUTTING CAN PUT BOTTLENECKS INTO NEW PLANTS

Trimming over-capacity, squeezing equipment bidders may save now, be expensive later . . . page 21

A PUTMAN PUBLICATION "Executive Magazines for Industry" $1.00 the copy

Which of these seven

B&A® CHROMIUM COMPOUNDS

can you use?

The 7 chromium compounds listed below are an important new group of fine chemicals now being produced by General Chemical under its "B&A Quality" label. They have many superior characteristics—in purity, in particle size, in uniformity. And a host of uses, too.

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- ☐ **Calcium Dichromate**
- ☐ **Chromyl Chloride**
- ☐ **Cobalt Dichromate**
- ☐ **Lithium Chromate**
- ☐ **Lithium Dichromate**
- ☐ **Magnesium Chromate**

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Company_____

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Check 1756 opposite last page.

conventions and exhibits

May 1-5. The Electrochemical Society, Inc., Meeting, La-Salle Hotel, Chicago, Ill.

May 7-13. The Society of the Plastics Industry, National Conference and Annual Meeting, Cruise on "Queen of Bermuda."

May 9-13. Instrument Society of America, Instrument-Automation Conference and Exhibit, Brooks Hall, San Francisco, Calif.

May 9-13. American Society for Metals, 2nd Southwestern Metal Exposition and Congress, State Fair Park, Dallas, Texas.

May 11-13. American Material Handling Society, with the 3rd Annual Western Handling Show and Packaging Cavalcade, Great Western Exhibit Center, Los Angeles, Calif.

May 11-13. Synthetic Organic Chemical Manufacturers Association, Spring Outing, Shawnee Inn, Shawnee-on-Delaware, Pennsylvania.

May 11-14. The Fluid Controls Institute, Inc., Spring Meeting, The Greenbrier, White Sulphur Springs, West Virginia.

May 16-17. 46th Midyear Meeting of the Chemical Specialties Manufacturers Association, Drake Hotel, Chicago, Ill.

May 17-18. Chemical Marketing Research Association, Annual Meeting, Hotel Biltmore, New York City.

May 22-26. Air Pollution Control Association, Annual Meeting, Netherland-Hilton Hotel, Cincinnati, Ohio.

May 23-26. The Design Engineering Show and Conference, Coliseum, New York City.

June 1-3. Meeting of the Commercial Chemical Development Association. Theme — the Process Industries Challenge Chemicals, Sea View Country Club, Absecon, N. J.

... Meetings and shows of interest to the chemical industries

June 6-8. The Material Handling Institute's New England Show, Commonwealth Armory, Boston, Mass.

June 9-11. 88th Annual Meeting, Manufacturing Chemists' Association, The Greenbrier, White Sulphur Springs, West Virginia.

June 13-15. The Chemical Institute of Canada, 43rd Annual Conference and Exhibition, Chateau Laurier Hotel, Ottawa, Ont.

June 19-22. American Institute of Chemical Engineers, Del Prado Hotel, Mexico City, Mexico.

Aug. 8-9. Third Annual Rocky Mountain Spectroscopy Conference, Rocky Mountain Spectroscopy Section of the Society for Applied Spectroscopy, Denver, Colo.

Aug. 10-12. 9th Annual Denver Research Institute Metallurgy Div.'s X-ray Conference, Denver, Colo.

Aug. 14-17. American Institute of Chemical Engineers, 4th National Heat Transfer Conference, Statler Hotel, Buffalo, New York.

Aug. 23-25. Cryogenic Engineering Conference, University of Colorado, Boulder, Colo.

Sept. 13-15. A new chemical show, Chemical Exposition U.S.A., will be held — for the first time — at the Statler Hilton Hotel in New York City. It will be held concurrently with the 138th National Meeting of the American Chemical Society. Exposition will be sponsored by the New York Section of the ACS. Emphasis at exposition will be on the basic chemical companies, with the addition of instrument and laboratory firms.

Sept. 25-28. American Institute of Chemical Engineers, Mayo Hotel, Tulsa, Okla.

Sept. 26-30. Instrument Society of America, Instrument-Automation Conference and Exhibit, Coliseum, New York City.

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CHEMICAL PROCESSING

HIGHLIGHTS

MAY 1960

VOLUME 23 • NUMBER 5

Special This Month

21 How much should a new plant cost?
Trimming over-capacity, squeezing equipment suppliers offer rewards—and risks

22 CPI ducking the additives issue
Turn-cheek 'defense' must be shed and true facts broadcast to reclaim waning public confidence

27 Spotlight on handling, packaging and shipping!
Closed-circuit conveying, squeeze bottle printing, resin bagging, vinyl scrap recovery only a sampling of topics in 36-page section

28 Containerization trims fat from freight budgets
Piggyback, fishyback, birdyback pace "revolt" in transportation, offer CPI shipper price break

64 Bright future looms for organo-aluminums
Use in catalysts grooms versatile compounds, once lab curiosities, for more important tasks

122 Pechiney-Grace urea process proves out
W. R. Grace's faith confirmed by high yield, quality from trouble-free operation at Memphis

THIS MONTH'S COVER

Dramatized on our cover this month is the dilemma which confronts company management when planning new construction. While there are many conventional avenues for cutting costs, they are lined with risks. Some of these approaches, such as trimming over-capacity and forcing down equipment prices, are surveyed and consequences analyzed in "The Intriguing Problem of Reducing Process Plant Costs" beginning on page 21.

INDEX

20 Chemical Business
64 Chemical Materials
85 Chemical Stocks
9 Chem-Trends
2 Conventions & Exhibits
108 Corrosion Control
189 Current Literature
103 Engineering Data
146 Ideas
15 Letters from Readers
27 Material Handling & Packaging
93 New Solutions of Processing Problems
8 Our Growing Industry
169 Plant Engineering, Maintenance & Safety
131 Process Instrumentation & Laboratory Apparatus
158 Processing Equipment
187 Recent Books
12 Spotlight on People
122 U.S. and World Petrochemicals
90 Watching Washington
206 Advertisers Index

Other Features

26 Canada-U.S. bloc urged to survive in world trade
33 Transfer-labeling slashes squeeze-bottle print costs
38 Closed-circuit conveying finds rising CPI demand
72 Rising rocket role seen for reinforced plastics
93 Modified Teflon packing, rings trim downtime
96 Metal-edge filters speed phenolic resin production
108 Hard-facing reduces elbow burnout rate in cracker
115 Glass exchangers handle bromines in 1/5 space
126 Shutdown averted with 624' cooling tower
131 Monitoring by nucleonics sparks new interest
146 Planning pays as polymer plant fills gap in crisis
158 Detergent-feed clogging of dryer stopped by mill
169 Head loss, installing time cut by welded steel tube
175 Pipe 'sweat' stopped cold by urethane insulation

over the editor's shoulder

Here's your big chance to trim freight tabs

When did you "huddle" last with your director of traffic? Are you fully aware of the revolution under way in transportation?

More-competitive rate-making—plus technological breakthroughs in containerization ideas — are every day giving your traffic man more opportunities to trim freight bills.

With transportation costs running anywhere from around 6½ to 25% of sales in the CPI, it's obvious that here is a prime target for cost reduction. Schemes such as "piggyback, fishyback and birdyback" are already paying off handsomely for many companies. But this is only the beginning.

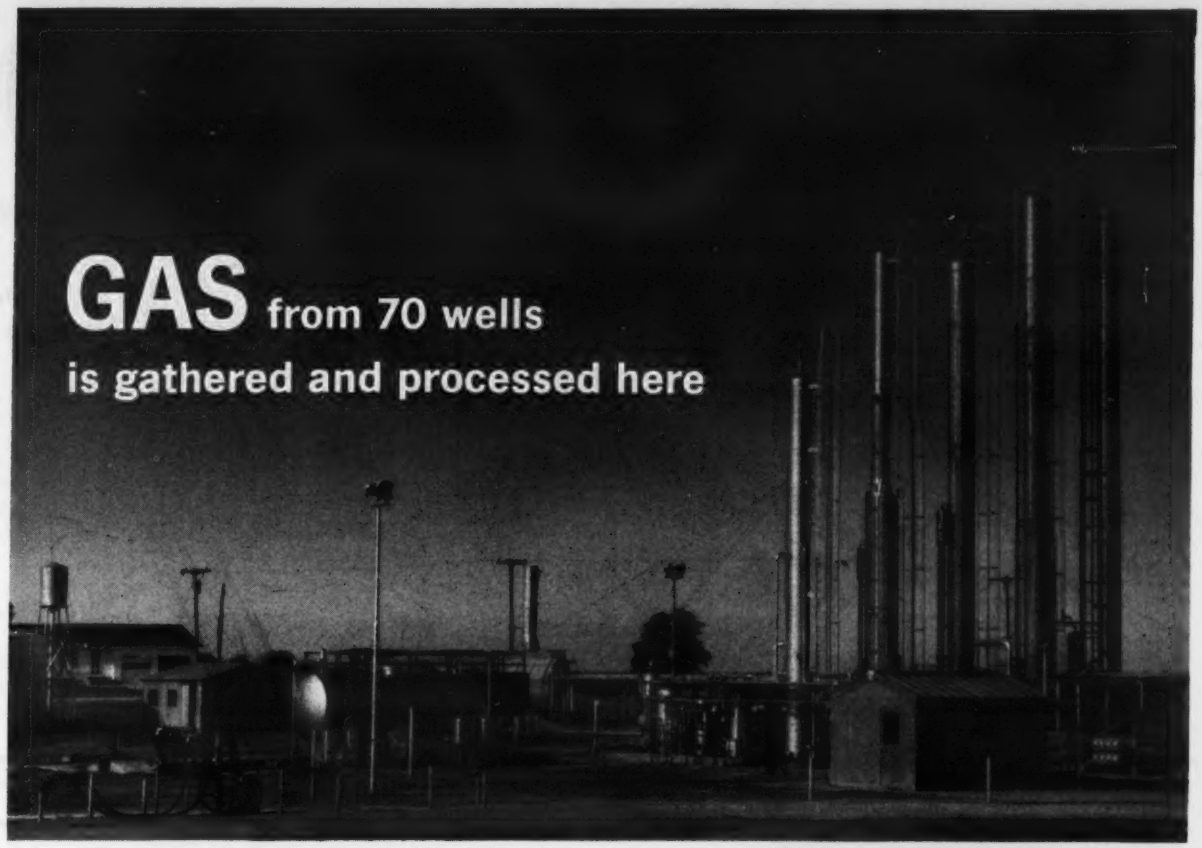
The Interstate Commerce Commission shows strong indication that it will relax certain restrictive rates to foster inter-carrier competition. There are earnest efforts under way to achieve some degree of standardization so that containers can be efficiently and inexpensively transferred from one type carrier to another.

With the stakes high, this area would appear to be one that demands considerable attention by top management. If you've had any tendency to "accept" freight costs "because that's what the published tariffs say," we suggest that a reshaping of attitude is in order. The road is opening fast to the goal of give-and-take competitive bargaining and the chance for sizable savings . . . for those shippers ready to take full advantage of the situation.

For a starter, read CP's exclusive report on the status of future of containerizations plan, page 28 this issue.

Dana B. Berg

Executive Editor



"JENKINS valves give us the dependable performance our operations demand."

— states Kerr-McGee Oil Industries, Inc., Oklahoma gas producer

How Kerr-McGee's field processing plant in Lincoln County, Oklahoma, gathers and extracts valuable hydrocarbons from gas before delivering it to the consumer is an interesting story, briefly told below. But you need not know the process to appreciate the fact that maximum reliability in valves is a "must".

The valves that assure Kerr-McGee of dependable, trouble-free performance bear the same name as that written on piping layouts of critical jobs of all kinds for almost a century. Experienced engineers, contractors and operating executives know that "JENKINS" stands for an extra-measure of quality. They know it is the best guarantee of long, trouble-free service. There's no extra cost attached to this specification for extra quality, so you can use it for any job. Jenkins Bros., 100 Park Ave., New York 17.

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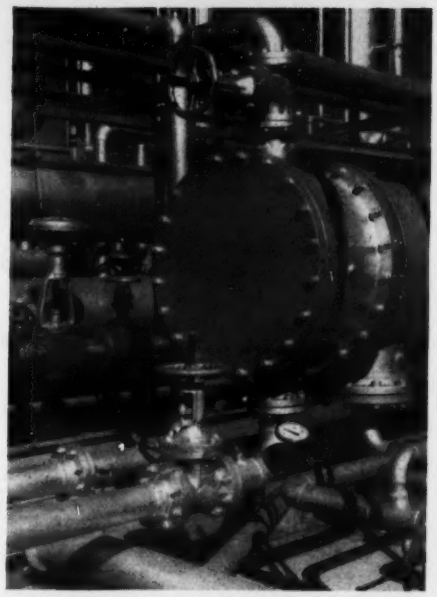

Jenkins Gate Valves on lean oil cooler to the absorber

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LOOK FOR THE JENKINS DIAMOND

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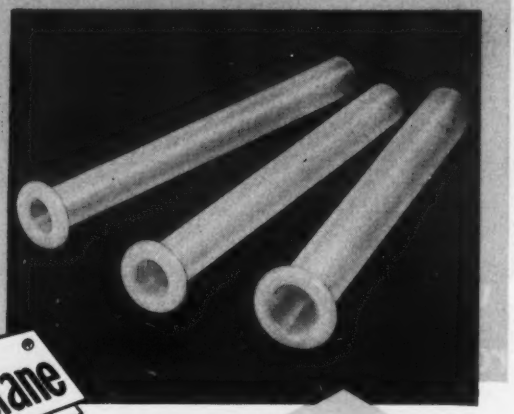

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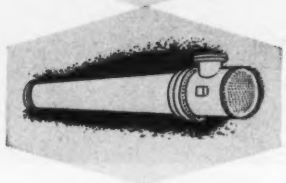

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* Nylon, Polyethylene or Phenolic Resin

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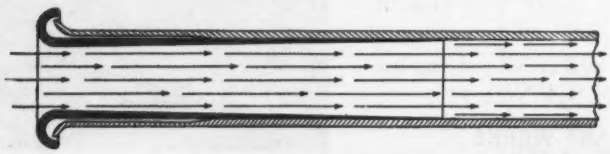

Get the facts. Request new Bulletin P-335.

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Check 1759 opposite last page.

CHEMICAL PROCESSING

May 1960
Volume 23 • Number 5

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and CHEMICAL BUSINESS

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Published Monthly by
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Advertising Representatives—page 206

Accepted as Controlled Circulation publication at Mendota, Illinois. Publication office: 1501 W. Washington Road, Mendota, Illinois. Address all correspondence to Editorial and Executive office, 111 East Delaware Place, Chicago 11, Illinois

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OTHER SUBSCRIPTIONS — from "non-qualified" persons (those who are not key processing men in the chemical industries) — are accepted at $1.00 the copy, or $10.00 the year. Foreign subscriptions — subscriptions from countries outside the territory of the United States and its possessions — are acceptable at $35.00 per year. Such subscriptions are not counted as "industry circulation" on BPA audit reports.

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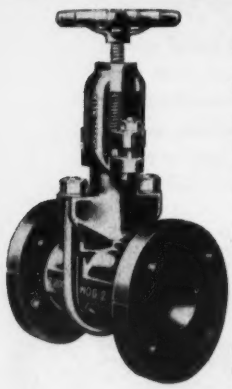

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Check 1761 opposite last page.

CHEM-TRENDS / Our Growing Industry

AviSun Corporation has awarded the engineering contract for a 100 million lb/yr polypropylene plant to Bechtel Corporation of San Francisco, California. The engineering plans call for plant to be located in eastern part of the United States, although the site has not been finally selected.

AviSun, created about a year ago as a joint venture of American Viscose Corporation and Sun Oil Company, began operating a 20 million lb/yr polypropylene plant at Port Reading, N.J., in September 1959. Port Reading facilities are being expanded to 25 million lb/yr capacity. With options now in effect, AviSun could extend polypropylene resin capacity to reach 150 million lb/yr.

Sun Oil Company has first in successful operation a $2 million propylene plant at company's Marcus Hook refinery. The new plant produces a material with a purity of 99.9%, from refinery gas streams. Plant is designed for a potential capacity of 120 million lb/yr.

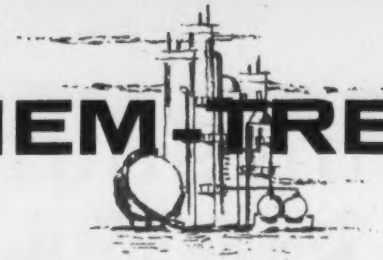
Dow Chemical Company is planning a $30 million expansion program at company's Louisiana Division, Plaquemine, Louisiana. Construction will include a plant for production of ammonia, increases in production capacity for chlorine, caustic soda, vinyl chloride. Expansion will take place over the next two years with completion and start-up scheduled for late 1961 and early 1962.

Copolymer Rubber & Chemical Corporation expects to start a $5 million expansion of its butadiene plant at Baton Rouge, Louisiana. Completion of the project by May 1961,

To page 10

AS CP's EDITORS SEE THEM

CHEM-TRENDS



The Poisons in Your Food
by WILLIAM LONGGOOD

Simon & Schuster, NY, 1960.
277 pp., $3.95

Reviewed by **HOWARD MILLEVILLE**
Editor, **FOOD PROCESSING**

The basic argument throughout the book is that poison is still poison no matter how small the dose, that the traces of chemicals used as food additives as well as insecticides, fertilizers, weed killers, livestock medicants, etc., accumulate in the body and eventually cause all the degenerative ills plaguing modern civilization.

Unfortunately, this sensational and damning indictment of the chemical as well as the food industry gives the impression of being authoritatively documented.

But when the numerous literature citations appearing throughout the book are investigated, they become some of the phoniest faddists in the country.

How do we answer such charges which are being levied against the chemical industry in increasing intensity?

According to Dr. H. F. Smyth, Jr. of the Mellon Institute, the toxicologists give us two axioms. One is that there are no harmless substances, only harmless ways of using substances.

Another axiom of toxicology is that dilution will attenuate any harmful action to insignificance. A detailed, authoritative statement on "Insignificant Levels of Chemical Additives" is in the December 1959 edition of "Principles and Procedures of Evaluating The Safety of Food Additives."

For a free copy of this 12-page booklet, write to National Academy of Sciences, National Research Council, Washington 25, D. C.; ask for Publication 750.

CPI must speak up against biased additives reporting — see page 23.

Will Cost of FDA Requirements Squeeze-out Smaller Firms?

Only the largest firms may afford the expense of new product development made mandatory by the Food Additives Amendment. Efforts may be centered on only those products indicating surest promise of investment return. These are concerns of industry leaders.

At a recent conference at which the miticide "Tedion" (tetrachlorodiphenylsulfone) was introduced, veteran chemical marketer Jack Vernon (FMC v-p) estimated added tests required to meet the Delaney Clause (carcinogenic effects) alone probably added $100,000 to the cost of its commercial chemical development.

Recently, (CP, March 1960, page 28) John Frawley of Hercules said that for his company, "the amendment will mean an investment of between $½ and $1 million for investigations to reaffirm the safety of established products used in *food packaging alone.*" (Our italics.)

The MCA reminds us that more than half the industry's products were not in production, many were not known ten years ago. More than 90% of the 4000 drugs and pharmaceuticals were developed within this period.

The cost to test these products to meet present FDA requirements would have been staggering — impossible. Curtailment of both activity and participation is likely under the present framework of regulation and interpretation.

Basic Producer Does Not Have Full Control Over End Use,

says Research Executive

One of most trying considerations of a developer of basic chemical materials under the Food Additives Amendment is that certifications are for individual applications. Each application test adds large expense to product commercial development.

"In addition to this," comments a well-known plastics research executive, "the basic producer of plastics raw materials has no way of knowing for certain *how* his materials are used. Plastics dinnerware, for example, requires no certification. But one of the multitude of molders might decide to make butter containers out of dinnerware molding powder. When cases like this are discovered, the basic resin supplier makes every effort to advise and if necessary warn the manufacturer about uncertified use of the material. But what happens beyond that is up to him and, perhaps, the FDA."

Now the Research Institutes Undergo Tax-status Scrutiny

Many research institutes face uncertain futures.

A proposed tax regulation would put these institutes on the same basis as private research organizations, who pay conventional taxes.

Institutes would have to publish all research findings on privately sponsored projects or pay taxes on these projects. Most private sponsors would not consent to immediate public disclosure of findings. Higher charges for private research or exclusive Government sponsorship seem the alternatives. Institutes accounted for about $250 million of research in 1959.

BRIEFS

▸ Over $111,000 in **unrestricted grants-in-aid** will be distributed by Hercules among 30 colleges and universities.

▸ New synthetic jet plane oil produced from petroleum raw materials threatens to displace other synthetic jet lubes presently based on vegetable origin. Reason: **new lube can be stored longer** (five years or more) in tropical areas without deterioration, according to **Esso**, its developer.

▸ Day-long **psychological drama** was main program element used by CCDA in recent New York meeting. Cast from member ranks played roles comparable to those in normal jobs, but with a hypothetical product and company. Result: Members in audience laughed, applauded when usual committee trials and tribulations were displayed. Said one, ". . . enjoyed it thoroughly, now have better understanding about others who have to work with us commercial development guys."

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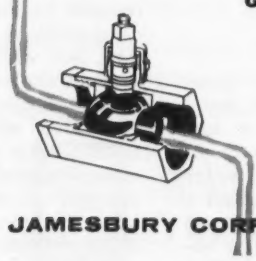

JAMESBURY BALL VALVES... HELPING BUILD OUR NUCLEAR NAVY

JAMESBURY CORP., 64 NEW STREET, WORCESTER, MASS.

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Check 1762 opposite last page.

CHEM-TRENDS

From page 8

will result in a 50% increase in company's butadiene production.

Monsanto Chemical Company's Inorganic Chemicals Division has begun construction on plant to manufacture 105% phosphoric acid. Although concentrated acid can be readily diluted to regular acid strength, company will also manufacture both 75% and 85% acid at the new plant, which is scheduled to go on-stream in early September. Neither cost nor capacity of the new plant have been announced.

Continental Carbon Company has boosted furnace carbon-black capacity by 25 million lb/yr with startup of new unit at Westlake, La.

Ultra Chemical Works, Inc., a subsidiary of Witco Chemical Company, Inc., has begun construction of its second plant for production of detergents and detergent chemicals. Installation, scheduled for completion late this year, will be located at Witco's site in the Clearing area of Chicago. Continuous sulfonation is expected to produce 30 million lbs of dodecyl benzene sulfonate a year.

Armour Alliance Industries has announced the opening of industrial adhesives plant in Philadelphia, Pennsylvania. Plant is equipped to formulate animal-base, resin-base, vegetable-base and blood adhesives, and will service industrial adhesive customers throughout the eastern U. S.

Atlas Powder Company has undertaken a $2 million expansion of ammonia, urea, nitric acid and nitrate facilities at its Lima, Ohio, plant. Its expansion will result in an annual increase in ammonia production of approximately 25,000 tons/yr with completion anticipated during 1960.

Naugatuck Chemical Division of United States Rubber Company will construct a new technical center in Naugatuck, Connecticut, to broaden research for new products and speed technical service. Engineering is now underway with construction scheduled to be-

gin in mid-year for completion in 1961. Center will have approximately 37,500 sq ft of floor space and a proposed staff of about 100.

Alco Oil & Chemical Corporation recently completed a 30% expansion of its production facilities for Alcogums.

Foreign Plants

Cyanamid International, American Cyanamid Company's overseas operating division, has announced plans to construct a plant to manufacture melamine on land adjacent to Cyanamid's present pharmaceutical plant at Gosport, England. Capacity will be 6 million lbs/yr with completion set for early 1961.

Columbian Carbon Company will construct a plant for the manufacture of carbon-black near Toronto, Canada. This facility is expected to begin operation in 1961 with an initial annual capacity of approximately 40 million lb of oil-furnace black.

Reichhold Chemie and Deutsche Erdol-Aktiengesellschaft have signed an agreement to produce petrochemicals in a plant to be constructed at Brunsbuettelkoog, Germany. Plant, which is slated to begin production in early 1961, will be operated by company jointly formed by Reichhold Chemie and DEA.

Houilleres du Bassin de Lorraine has placed in service an acetylene plant in Carling, (Moselle) France. Feed for the plant will be methane extracted from coke oven gas. Acetylene will be used to produce acrylonitrile.

NEXT MONTH

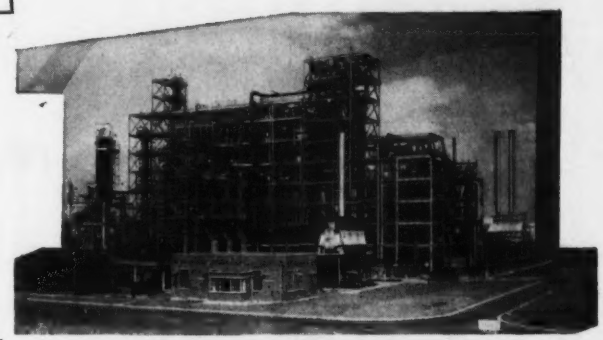
Having trouble selling your material-handling-improvement ideas to top management? We found that you're not alone, because this is a problem to many. To help you, we've assembled a panel of six top material handling men from the CPI to give you some tips that should help you in your future project and program selling. Look for this Exclusive CP Panel report in June.

ICI

KELLOGG

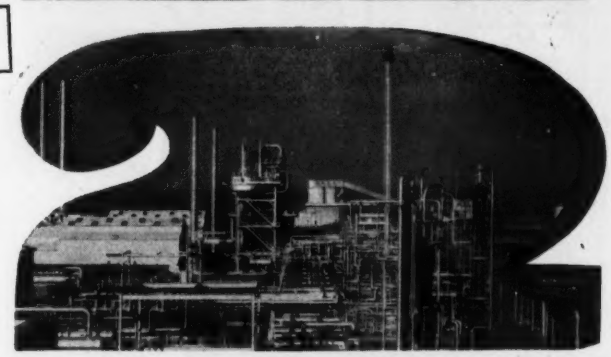
KELLOGG BUILDS FOR I.C.I. EXPANSION

1951



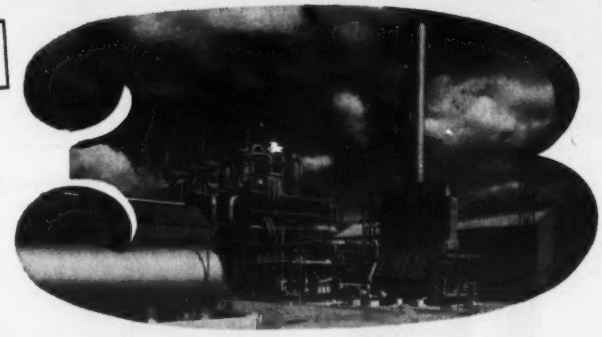
Recent completion of Imperial Chemical Industries' third olefin plant at Wilton, England, has made these Works the largest petrochemical venture outside the United States. With a current output of 110,000 tons per year of high-purity ethylene, and a potential output of 140,000 tons, I.C.I. Wilton is an outstanding example of engineering cooperation.

1956



The first plant was commissioned in 1951, and was the first full-scale adoption of the then novel process of oil pyrolysis developed in the Kellogg Laboratories. Its success led to the addition of No. 2 plant in 1956, and then to this latest extension, representing a 60% increase in olefin capacity, in 1959.

1959



Cooperation between client and contractor is the keynote of Kellogg's contribution to chemical engineering. The Wilton Olefin Plant is the largest in the world based on liquid feedstock. Kellogg is proud to have been associated with its development.

To learn more about Kellogg's background in engineering and building olefin plants, at home and overseas, write for current Kelloggram

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York 17, N. Y. *A Subsidiary of Pullman Incorporated*

Offices of Kellogg subsidiary companies are in Toronto, London, Paris, Buenos Aires, Rio de Janeiro and Caracas

Check 1763 opposite last page.

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METAL PRODUCTS COMPANY, INC.
A.S.M.E.
CODE CONSTRUCTION

418 PINE STREET, PHILIPSBURG, PA.

Check 1764 opposite last page.

Spotlight On People

DR. HEINZ HEINMANN, president of the 1960 International Congress on Catalysis (Paris, France, July 4-9) believes our well of fundamental knowledge about catalysis may be running dry. This noted authority on applied catalysis states, "We have had great commercial success from efforts directed at putting catalysis into large-scale use. We are still seeing millions poured each year into development work. Evidence, however, of significant increases in the amount spent on fundamental research in this field is coming largely from France and the Soviet Union." Principal objective of the Congress is bringing together outstanding authorities from many countries, to focus attention on progress in the fundamentals. The idea for the Congress was originated in 1954 by a small group of American catalysis chemists. The First Congress was held in Philadelphia in 1956.

Executive promotions were announced by Stepan Chemical Company. Dr. DAVID B. HATCHER becomes executive vice president, WILFRED J. CREPEAU his assistant, DONALD H. FRANCIS, vice president. Formerly, Mr. Francis was general manager of the Maywood Chemical Co., division of Stepan.

JOHN L. HAMMER JR., was appointed assistant to the president by Merck & Co., Inc.

National Carbon Company, division of Union Carbide Corporation named CURRY E. FORD as director of marketing.

G. C. CUSACK was named president of Pure Carbonic Company, division of Air Reduction Company.

Union Carbide Nuclear Company, division of Union Carbide Corporation appointed J. CALVIN BRANTLEY as director of research.

The Minnesota Mining & Manufacturing Co., announced the election of LOUIS F. WEYAND as vice chairman of the executive committee and J. F. WHITCOMB as divisional vice president in charge of the Coated Abrasives and Related Products Division.

Reichhold Chemicals, Inc., announced the election of HERBERT L. WAMPNER to their board of directors. Mr. Wampner fills the vacancy on the board resulting from the death of Mr. F. A. Jolles.

UBS Chemical Company announced the appointment of JOHN A. ENGLAND, JR., as secretary-treasurer.

The Kordite Company, division of National Distillers and Chemical Corporation appointed two associate research directors, DR. ROBERT H. STEINER and DR. HARRY A. KAHN.

S. K. DERDERIAN was elected a member of the board of directors of Metal Hydrides Incorporated.

Rohm & Haas Company announced the appointment of DR. CHARLES H. MCBURNEY as director of research.

RAY C. SMITH has been elected vice president and a member of the board of Sinclair Petrochemicals, Inc.

VERNON WOODSIDE was named manager of sales development and J. L. PICKENS as manager of field sales in Chemicals Division of Olin Mathieson Chemical Corporation.

DONALD C. OSKIN has been named to the newly created position of vice president of

To page 14

THAT'S INTERESTING

Cotton's rule unshrinking

Cotton is still king over two-thirds of the textile fiber realm as a result of a series of chemical developments that have upgraded cotton from plain everyday material into top wash-and-wear contender. In 1959 some 4 billion yards of cotton were treated for quick-drying and wrinkle resistance.

Shark flies high on jet

Tris amino was credited with an assist for successful coast to coast flight aboard jet airliner of 25 lb tiger shark. Chemical was added to water-filled crate housing shark as a buffer to reduce harmful effects of CO_2 accumulating in water. Shark was flown from New York City Aquarium to San Francisco in 4 hours.

For more information on product at right, specify 1765 see information request blank opposite last page.

Maintaining a constant temperature of 70 to 72° F in a 16⅔% sulfuric acid solution is an ideal application for Platecoil... typical of many engineered by Tranter Manufacturing inc., Lansing, Michigan.

Corrosive environments dictate the use of stainless steel, Tranter's rigid production requirements dictate the use of J&L Consistent Quality stainless steel.

Why J&L? Here's the reason given by Mr. M. C. Nolen, Tranter Purchasing Agent:

"Tranter uses J&L stainless because of its uniform quality. It takes all the headaches out of raw materials and makes our job a matter of just processing this superior product."

Plants and Service Centers:
Los Angeles • Kenilworth (N. J.) • Youngstown • Louisville (Ohio) • Indianapolis • Detroit

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SHEET • STRIP • BAR • WIRE

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NEW EVAPORATOR SPEEDS GELATIN PRODUCTION

Gelatin, like other heat sensitive food products must be processed quickly if a pure, high-quality product is to be obtained. The double-effect, long-tube, vertical Swenson evaporator shown above was specially engineered for minimum product retention. A 3 per cent gelatin solution is processed at the high rate of 11,500 lbs. per hour, yielding a top-grade 20 per cent solution required for drying. A thorough understanding of the problem, careful planning and engineering, and the finest construction produced this efficient, stainless unit, adaptable to the processing of many food products. Its quality is typical of all Swenson equipment for the food, chemical, and petroleum industries. Whatever your needs in evaporators, spray dryers, crystallizers, or special equipment, call on your Swenson engineer.

WRITE for more information on Swenson evaporators. Ask for Bulletin E-100.
Swenson Evaporator Company, 15667 Lathrop Avenue, Harvey, Illinois

PROVED ENGINEERING FOR THE PROCESS INDUSTRIES SINCE 1889

SWENSON

A Division of WHITING Corporation

WHITING—MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY AND RAILROAD EQUIPMENT

Check 1766 opposite last page.

PEOPLE

From page 12

executive sales of the Chemical Division, Food Machinery and Chemical Corporation.

S. J. SPITZ JR. has been named executive vice president of Newport Industries Company, a division of Heyden Newport Chemical Corporation.

E. I. du Pont de Nemours & Company announces new promotions: WILLIAM D. EATON, has been promoted to managing director and chairman of the board of directors of du Pont de Nemours International S.A. Mr. Eaton succeeds DAVID H. CONKLIN, who will concentrate on his expanding responsibilities as European director of the parent company. GEORGE C. VENNUM, was named to take over Mr. Eaton's former position as director of finance and secretary. DONALD H. WEBER, was named as deputy director of finance and assistant secretary (Nederland), WILLIAM H. JONES, deputy director of finance and assistant secretary (Belgium), and ADRIAN C. FURSE-ROBERTS as deputy treasurer of Du Pont Company (UNITED KINGDOM).

ARE YOU A CARTOONIST?

If so, you can recognize humorous incidents in chemical processing operations that can be turned into profits for you.

CHEMICAL PROCESSING will pay:

$10 for black ink cartoons (with gag lines) on 8½" x 11" sheets — ready to reproduce — payable on acceptance.

$5 for cartoon ideas — written descriptions or rough sketches of scenes — and captions

Send your cartoon material to:

Cartoon Editor
CHEMICAL PROCESSING
111 East Delaware Place
Chicago 11, Illinois

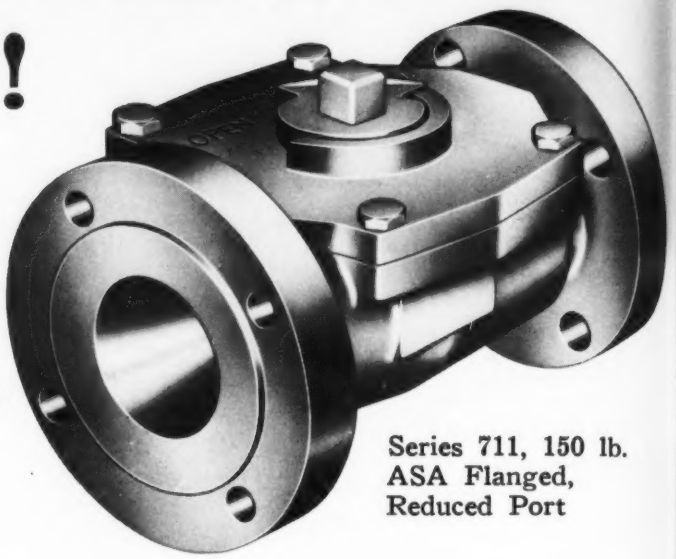
Don't forget to include your name, address, and company affiliation.

totally
new!

Only *FLO·BALL* valves are bearing-fixed for maintenance-free long life!

. . . with all the features you must have:

- **Top loading**
- **Replaceable seats**
- **One-piece ball and stem**
- **90° on-off**
- **Two-way flow**



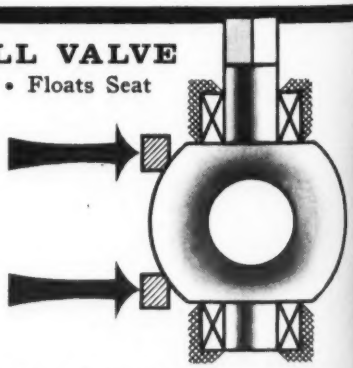
Series 711, 150 lb. ASA Flanged, Reduced Port

Now available . . . the result of years of intensive service in the missile-space industry . . . proven in thousands of adverse applications . . . now at mass produced prices . . . the most advanced line of ball valves ever manufactured . . . for you!

ORDINARY BALL VALVE
Floats Ball • Fixes Seat

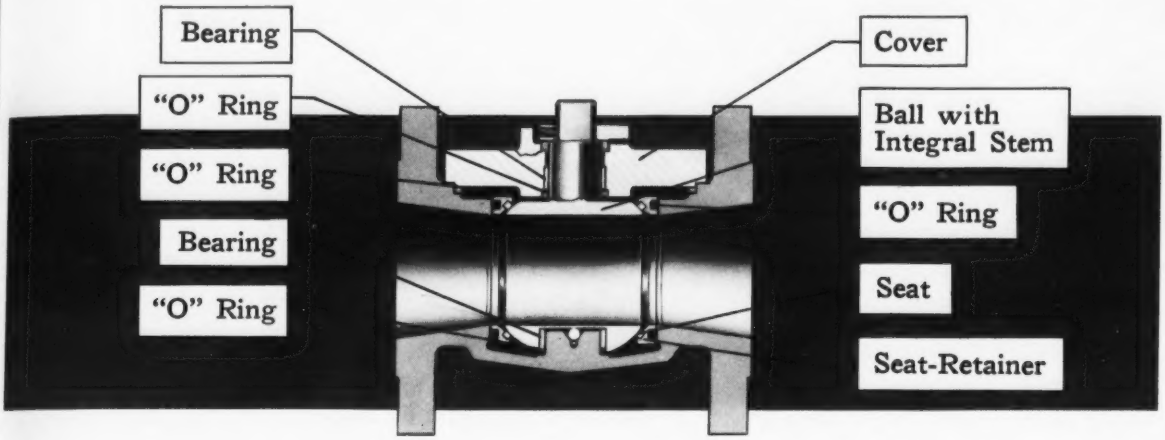
Floating ball puts excessive pressure load on fixed seats. Results in distortion and short life.

FLO • BALL VALVE
Fixes Ball • Floats Seat



FLO·BALL bearings absorb all pressure forces. Elimination of excessive seat loading insures long life.

The Series 711 ***FLO·BALL*** valves are available for off-the-shelf delivery. Manufactured to standard ASA dimensions in carbon steel, 316 stainless steel, and aluminum for body and ball, Teflon for seats, and Buna "N" O-Ring seals. Other materials are also available. These valves operate at pressures to 300 psi, temperatures to 400° F.



The Hydromatics Series 711 FLO•BALL valve gives you the features you must have!

- Bearing-Fixed ball. Engineered to withstand shock and impact without distortion or backlash.
- Top loading. Valve can be disassembled and assembled without removing it from line. No special tools are required.
- Self adjusting, replaceable seats. Both balanced seats are self-aligning and self-adjusting for controlled seat loading and positive seal.
- No lubrication. Operates completely without lubrication.
- Zero leakage. At all operating pressures, including vacuum to 10^{-6} mm. of Hg.
- One-piece stem and ball. Simplified construction adds strength, precision and lower torque.
- Maximum flow efficiency. The open ***FLO·BALL*** valve provides an unrestricted, straight-thru fluid path.
- Lowest torque. Bearing-Fixed construction results in effortless, fast-action with low torque.
- Two-way flow. Exclusive ***FLO·BALL*** seat design principle insures perfect seal in both directions.

Hydromatics, Inc.

FLO-BALL

Mail this postage-free card today

Tear Along This Edge

Gentlemen:
Your Bearing Fixed Flo•Ball valves from ⅛" to 24" may help solve a problem relating to the control of:

☐ Corrosive Liquids ☐ Cryogenic Liquids ☐ Throttling Flow
☐ Vacuum ☐ High Pressure

My flow problem is _____

_____

I now use Ball Valves in these sizes _____

PLEASE: ☐ Have salesman call ☐ Send technical data

My name _____ Position _____

Company name _____

Address _____

City _____ State _____

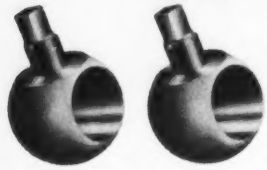
Bearing fixed

New Zero leakage

Maximum flow

Top loading

New



No lubrication

One piece ball and stem

New

Hydromatics, Inc.

LIVINGSTON, N. J. • WYMAN 2-4900 • TWX = LIVINGSTON, N. J. 120

BUSINESS REPLY MAIL
Postage Will Be Paid By

FIRST CLASS
PERMIT #40
LIVINGSTON
NEW JERSEY

Hydromatics, Inc.
Livingston, New Jersey

13579

Mail this postage-free card today

Windage Loss Lost

Sirs:

We note with interest the nomograph entitled "Continuous Blowdown of Boilers and Cooling Towers," which you published on page 63 of the January 1960 issue of CHEMICAL PROCESSING.

A little calculation indicates that this nomograph is based upon the assumption that the make-up equals the evaporation (or net loss on evaporation in the case of boiler) plus the blowdown. This is satisfactory in the case of a boiler. However, in the case of a cooling tower there is an appreciable windage loss in many cases. Thus the make-up equals the evaporation plus the windage loss plus the blowdown, if any, in such equipment.

The effect that this can have on the use of your nomograph may be indicated by an example. If it was desired to run a cooling tower at 10 concentrations, your nomograph would call for a blowdown equal to 10% of the make-up. Yet, for a great many of the cooling towers we have treated, the windage loss would be on the order of 0.1% of the circulation rate which, for a 10° temperature drop in the cooling tower, corresponds to about 10% of the make-up. In other words, it would be possible to maintain the desired concentration level with no blowdown. In this case, of course, the windage is performing the function of the blowdown.

Actually, there is nothing basically wrong with your nomograph that cannot be corrected by a clear definition of what is meant by "blowdown." In the case of a boiler, the ordinary definition of blowdown applies to this nomograph. In the case of a cooling tower, however, the term blowdown on this nomograph refers to the sum of the wind-

For more information on product at left, specify 1767 . . . see information request blank opposite last page.

HOW YOU CAN PUT TELEVISION TO WORK

A brief report on how to use KIN TEL closed circuit TV systems to cut costs, reduce errors, up efficiency

Today, hundreds of companies are solving a wide variety of business and industrial problems with KIN TEL closed circuit TV systems.

For example:

U. S. Steel uses a KIN TEL system to see inside open hearth furnaces.

The Los Angeles Department of Water and Power uses one for remote viewing of water-level meters.

Convair, Douglas, Lockheed, and Northrop all watch rocket tests with KIN TEL systems.

Westinghouse watches nuclear power reactor tests with one.

American Potash and Chemical monitors conveyor line and warehousing operations with one.

The San Francisco Naval Shipyard uses one to guard against pilferage.

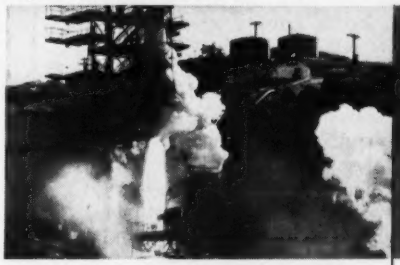
These, and many other KIN TEL customers—both large and small—have discovered a significant fact: *Closed circuit television is no longer a novelty.* It's a proven, practical piece of equipment that, in many instances, pays for itself within a year. It's a modern, money-making piece of equipment that you can use in your business, in your plant, in your operation.

What Is a Kin Tel Closed Circuit TV System?

The basic system manufactured by KIN TEL consists of a rugged yet sensitive camera that is small enough to hold in your hand; a receiver that displays pictures that are twice as sharp as you can get on your home TV set; and a camera control unit that is so automatic the only control you have to touch is the on-off switch.

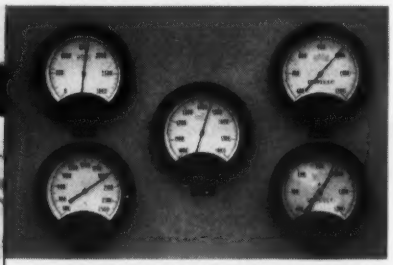
More Than Likely, Your Business Can Use Such a System.

You can use one to watch events or operations that are tedious, difficult, dangerous, or even impossible for men to watch.



Dependable KIN TEL TV systems see where men cannot survive; withstand tremendous extremes in temperature and pressure; perform both critical and routine jobs inexpensively, faultlessly, safely, tirelessly.

You can use one for data transmission.



All types of visual information–from blueprints to fingerprints to graphs–are transmitted over great distances quickly, accurately. Such systems save money, reduce errors and confusion, speed operations.

You can use one for surveillance work.

KIN TEL cameras scan vast areas; guard valuable equipment and property; never blink, quit, sleep, or make an error; watch many operations at once; transmit all information to a central monitoring point.

You can use one for on-the-job training.

Students study operations viewed by a KIN TEL camera. Such systems permit mass teaching that gives each student an unobstructed view; provide on-the-spot realism; end expensive, disturbing plant tours.

Here's What a Kin Tel System Can Do for Your Business

It can do what it is doing, right now, for hundreds of other firms. It can increase the over-all efficiency of your entire operation. It can help you tighten production and inventory controls, help you better your services to customers and clients. It can reduce errors and confusion and duplication. It can cut costs. It can save you time and money. It can free valuable men from tedious and routine tasks. It can give you the modern tools you need to keep pace in this highly competitive market.

For a more specific analysis of how KIN TEL TV can go to work for you, write direct for catalog 6-103 and the name of your nearest KIN TEL engineering representative.

8 Reasons Why So Many Firms Insist on Kin Tel TV Systems

1. Reliability. KIN TEL equipment is designed to keep working, day in and day out. It's the first choice for ICBM and other missile programs that depend on TV, that can't afford to compromise with reliability.

2. Picture Quality. Full 650-line resolution provides maximum delineation, essential for qualitative observation of complex operations, and for transmission of printed material.

3. Automatic Operation. KIN TEL TV is the only closed circuit system that provides entirely automatic, through-the-lens compensation for light-level changes of several thousand to one.

4. Sensitivity. With KIN TEL equipment, the light needed to read this page is enough for sharp, clear pictures; and usable pictures can be provided with less than one foot-candle illumination.

5. Ease of Installation. No site preparation is needed, no interacting electrical adjustments are required. All units fit in standard 19-inch racks.

6. Simplicity of Operation. With no changes in lens iris to make, the only thing the operator has to know is the location of the on-off switch.

7. Adaptability. A complete line of shelf-item system components and a variety of cameras and monitors permit observations of nearly every kind of operation, under all kinds of conditions.

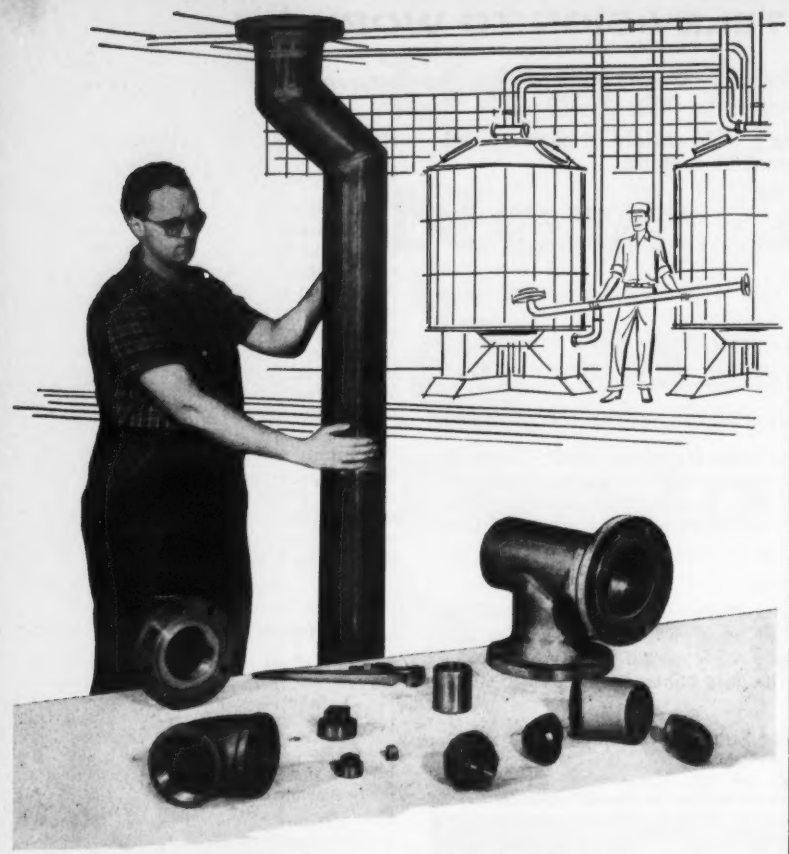
8. Application Help. You don't have to waste your money and time on application engineering. At no obligation, KIN TEL's nationwide factory-trained field engineers will determine whether or not a TV system can be put to profitable use in your intended application.

KIN TEL
A DIVISION OF
COHU
ELECTRONICS, INC.

5725 Kearny Villa Road, P.O. Box 623, San Diego 12, California, BRowning 7-6700

KIN TEL—pioneer and leader in closed circuit television

Check 1768 opposite last page.



AMPCO PIPE and FITTINGS

resist corrosive action of fatty acid hydrolysis

Ampco Pipe and Fittings resist corrosion, erosion, and cavitation-pitting of a wide range of alkalies and acids

Brinell hardness of 150 — tensiles up to 70,000 psi

High velocity tolerance —flow rates of 18-20 fps

Thread not distorted by wrenches or hammers — no leakage

Ampco Pipe and Fittings are made from a unique aluminum-bronze alloy that takes the trouble out of handling troublesome, corrosive media.

Look at how soapmakers use Ampco Pipe and Fittings, for example. In making soap, a solution of sulphuric acid is added to fatty acids. One company uses Ampco Pipe to transfer this solution from wooden tanks. Another uses Ampco Pipe and Valves — and, in addition, uses tank liners made of Ampco Metal.

You can get Ampco Pipe in all standard sizes, many from stock. Fittings are available to 3000 pounds; flanges, to 5000 pounds.

Write us concerning *your* problem.

AMPCO METAL, INC.
Dept. 131-E, Milwaukee 46, Wis. • West Coast Plant: Burbank, Calif.

AMPCO®

THE METAL WITHOUT AN EQUAL

Check 1769 opposite last page.

LETTERS

age and any additional blowdown which might be necessary.

We trust that these comments will serve to improve the utility of your nomograph.

SIDNEY SUSSMAN
Chief Chemist

Water Service Laboratories, Inc.

New York

Mr. Sussman is, of course, correct. His comments are appreciated.

F. CAPLAN

Oakland, Calif.

Only time will tell if clock runs well

Sirs:

On page 53 of the December issue you mention a clock which will be "in error no more than three seconds in 3171 years." Curiously, it may help to check Einstein, but not in the way the article reads.

In the infinity of space, with its billions of light years, there is no Time, as we know time, because for us there is no relativity of infinite time, no standard against which we can measure it.

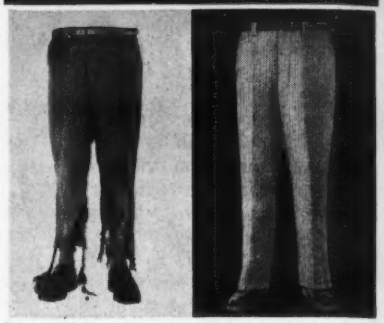
On earth we measure time by relation to the rotation of the earth on its axis and its path about the sun. Our time is purely "celestial time," related to our solar system. All astronomers agree that the earth is slowing down both in its rotation and in its orbital movement. This slowing is not a uniform factor, but is by inverse geometric progression.

We have never had any long-range accurate clock against which we could make comparisons at 100-year periods. But it is usually stated that the Egyptian day of 4,000 years ago was about one hour shorter than our day (the hour being the present length of hour).

Thus, your clock, in the 3171 years you mention, will be off about 45 minutes. But, with such a clock, if we set it accurately now, observers a century hence can check the rate of slowing of the earth by comparing astronomical ob-

To page 18

STILL BUYING COTTON or WOOL WORK CLOTHES?



Cotton work pants after less than one week under corrosive conditions.

Worklon pants of 100% Dacron after months of wear under same corrosive conditions.

Are you still watching your profits being eaten away by acids and corrosive chemicals? Why not switch to WORKLON **acid- and caustic-resistant** industrial apparel! **Save** as hundreds of plants and laboratories are now doing...yes, save up to 93% with WORKLON garments of 100% **Dacron*** and 100% **Dynel.**

A variety of **lint-free** and **static-free** acid-resistant styles to meet your every requirement. Read complete details in the new Worklon catalog just off the press. **New lower prices ... larger selection** of garments for both MEN and WOMEN. Send coupon for your **free** copy now!

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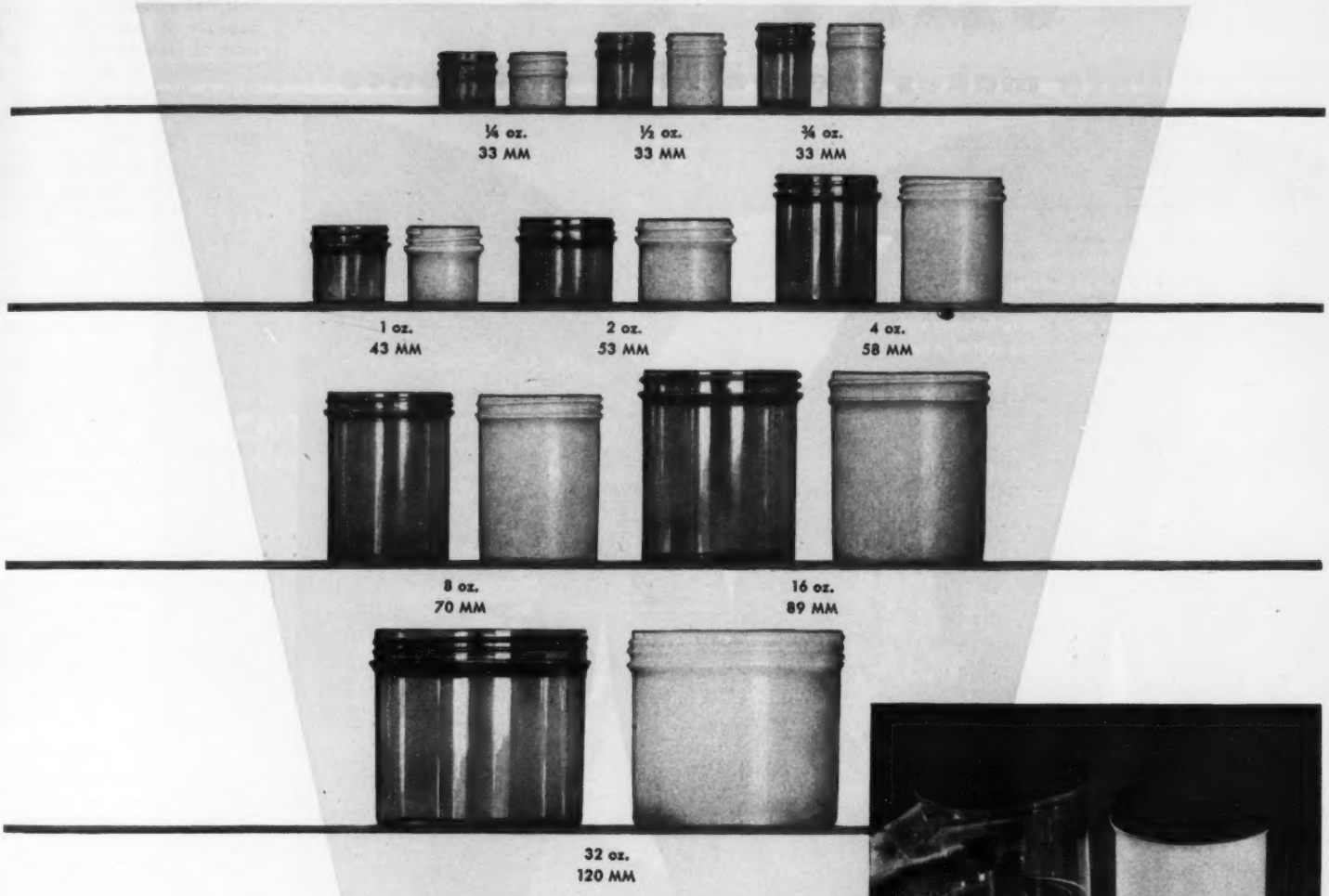
Check 1770 opposite last page.

CELLUPLASTIC

SQUAT JARS



A Complete Line.....
Competitively Priced

Whether you are selling soothing salves or fine powders, solder flux or cosmetic cream, the Clearsite squat jar is your answer to better packaging and lower shipping costs. Available from stock in nine sizes in clear polystyrene or linear polyethylene. Can also be molded in a wide range of colors to meet special requirements. Any design can be beautifully reproduced in our large and experienced multi-color printing plant. Standard closures available for all sizes.

Here's an attractive line of competitively priced jars that weigh about one-fifth the weight of glass jars of equivalent capacity. You benefit **three** ways: **better packaging, less breakage, lower shipping costs.** Write for samples and prices—Address Dept. 505D.

THE NEW 32 OUNCE PLASTIC JAR

This big beautiful 32 ounce jar has all kinds of packaging possibilities in linear polyethylene with overflow capacity of 32.3 fluid ounces—weight 211 pounds per thousand; or clear polystyrene with overflow capacity of 33.8 fluid ounces —weight 212 pounds per thousand. Either jar takes a standard 120 mm closure.

For more information check 1771 opposite last page

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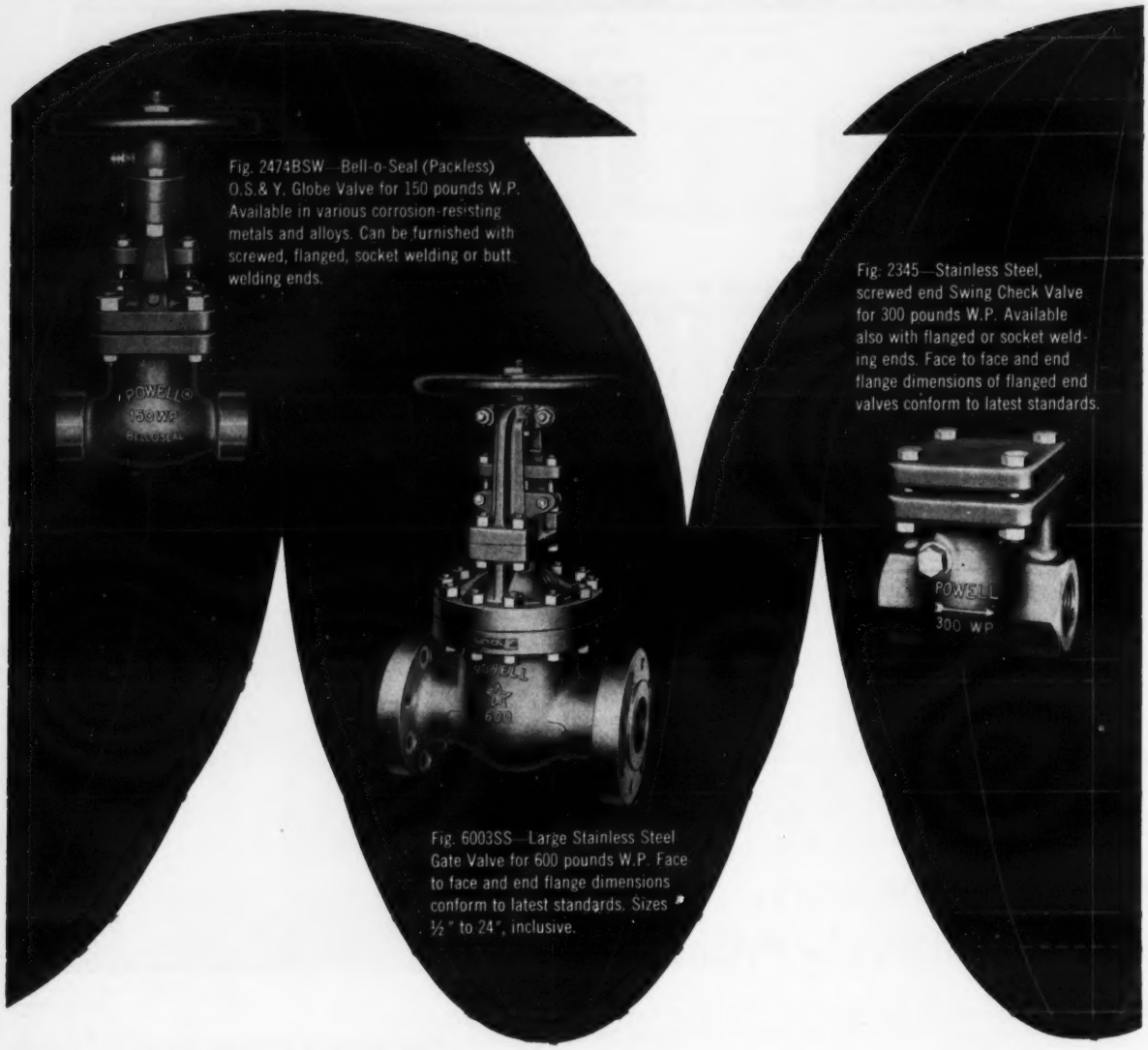

Fig. 2474BSW—Bell-o-Seal (Packless) O.S.& Y. Globe Valve for 150 pounds W.P. Available in various corrosion-resisting metals and alloys. Can be furnished with screwed, flanged, socket welding or butt welding ends.

Fig. 2345—Stainless Steel, screwed end Swing Check Valve for 300 pounds W.P. Available also with flanged or socket welding ends. Face to face and end flange dimensions of flanged end valves conform to latest standards.

Fig. 6003SS—Large Stainless Steel Gate Valve for 600 pounds W.P. Face to face and end flange dimensions conform to latest standards. Sizes ½" to 24", inclusive.

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Powell . . . world's largest family of valves

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Check 1772 opposite last page.

LETTERS

From page 16

servations against the time given on the clock. But it still will not measure infinite time because it will not give the rate of slowing of the sun in its rotation in our galaxy, the Milky Way, nor the rate of movement of the Milky Way galaxy in space.

GEORGE S. BRADY
10213 Tyburn Terrace
Bethesda 14, Maryland

Silicone lotions defended

Sirs:

I have noted in your March issue, page 166, a note ("Chemical Boobytraps") from John B. Walters of the Marler Chemical Company stating that dimethyl polysiloxanes, if introduced into the eye, cause irritation, and that the "irritation . . . is less hazardous than visual disturbance."

The temporary irritating effect has been noted before and can be minimized, as Mr. Walters points out, by education of employees. Washing the eyes with plain water generally assists in alleviating such irritation.

The statement that there is a "hazardous visual disturbance" implies a great deal more than it says, for there is no sudden irritation as with a speck of dust getting into the eye. The sub-heading "Skin lotions and creams can harm eyes" also allows the incorrect inference that there can be a permanent effect. Silicone-containing lotions are widely used in dermatology and cosmetics. It is difficult to justify the word "hazardous" with respect to them.

In our long experience with this material we have never found it to introduce a "hazardous" disturbance in the eye. This is confirmed by findings of toxicologists and opthalmologists.

DR. R. R. MCGREGOR
Director
Dow Corning Center for Aid to Medical Research through Technical Assistance and Information about Silicones
Midland, Mich.

THAT'S INTERESTING

Pollution lab mobile

Only mobile automotive lab in existence is being used by University of Michigan for exhaust gas analysis, corrosion problems in automotive structures, stress studies, and fuel economy tests. Unit was given to university's College of Engineering by International Nickel Co.

Indoors outdoors

Air pressure-supported vinyl-coated nylon dome makes possible year-round man-made weather for outdoor workmen and funseekers. Called Airhouse, dome was designed to house parts of construction projects so work could continue during bad weather. Airhouse 60 x 110 ft with 30 ft center height can not only be heated but supported by 450,000 BTU heater.

For more information on product at right, specify 1773 see information request blank opposite last page.

ECO ENGINEERING NEWS

the big name in small pumps for the process industries

ROTARY: If you want linear, non-segmented, non-foaming flows, ideal for shear-sensitive emulsions and safe for auto-detonating fluids—select the self-priming Eco ALL-CHEM Rotary displacement pump with twin opposed oscillating impellers. Designed for severe corrosive service. For reduced viscosities and temperatures to 250° F. Capacities to 10 gpm. Pressures to 100 psi. Suitable for metering in conjunction with Rotometers.

CENTRIFUGAL: If you want a widely applicable, corrosive-resistant centrifugal pump handling most chemicals, including slurries with particle size up to ⅛ of an inch, as well as troublesome sticky fluids—select the Eco CENTRI-CHEM Pump. This pump was designed to meet the standardization programs of major, multi-plant chemical companies. Capacities to 40 gpm. Heads to 57 feet.

GEAR: If you require self-priming and intermittent or sustained operation with constant flow metering and reproducible accuracy within plus or minus 1 percent, depending on viscosity—handling all commercial chemicals, acids, oxidants, alkalies, aromatics, solvents—select the Eco GEARCHEM Pump. For temperatures up to 400° F and viscosities to 10,000 SSU. Capacities to 10 gpm. Pressures to 100 psi.

GREAT VERSATILITY

The widest variety of metals and non-metallics for every corrosion and contamination problem are utilized in Eco Pumps. These include the stainless steels, Stellite*, Hastelloy* B and C, monel, nickel, zirconium and titanium; Teflon†, phenolic plastics, Hypalon†, Nylon, Penton×, ceramic, carbon, etc.

Mass Produced and Stocked for Immediate Delivery

Eco Pumps are *not* "custom built" with attendant slow delivery and high cost.

They are stock pumps, produced in volume on automatic "program" machine tools where multiple operations are performed to reduce needless labor and handling. This results in lower prices, precision uniformity and complete interchangeability of parts to meet customer requirements and to facilitate field servicing.

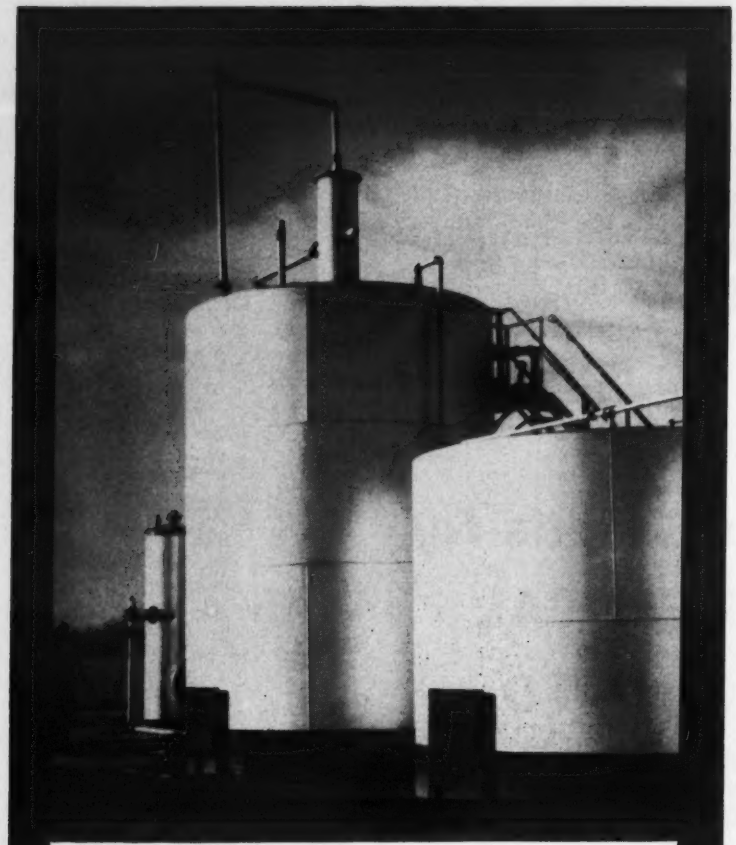
Ask for literature on the complete Eco pump line.

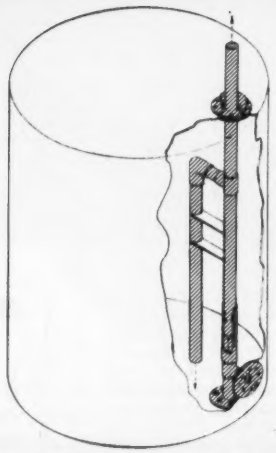
*Union Carbide Trademarks. †duPont Trademarks. ×Hercules Powder Trademark.

ECO ENGINEERING COMPANY · 12 New York Avenue · NEWARK 1, N.J.

Another new development using

B.F.Goodrich Chemical *raw materials*





Siphons are fabricated of piping and fittings of Geon by Green Contracting & Engineering Company, Wichita. B.F.Goodrich Chemical Company supplies the Geon vinyl.

Siphon separates oil from brine —no corrosion

it's made of GEON

Either the oil or the salt water in these oilfield gathering tanks in Kansas can make short work of ordinary pipe. Now, with pipe and fittings fabricated of rigid Geon vinyl, there is no corrosion problem at all. Geon solved another problem too: the buildup of paraffin, common in metal pipe, was eliminated.

Geon pipe proves ideal for a wide variety of applications because of its resistance to corrosion and its impact and tensile strength. Crews especially like its light weight and easy installation. Either solvent welding or threads can be used.

Here's another example of the way that Geon vinyl solves product problems—and opens new markets. For more information, write Dept. GO-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Geon VINYLS

B.F.Goodrich Chemical Company
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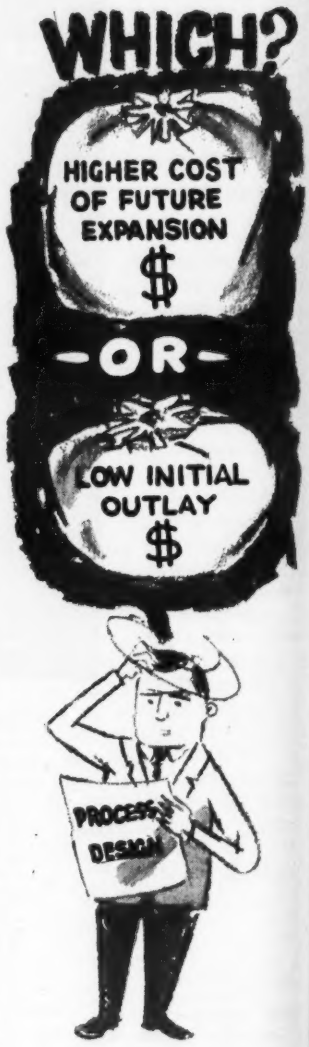


Check 1774 opposite last page.

intriguing problem of reducing process plant costs

by JOHN MELLECKER

HOW much should a process plant cost? This question is today in the minds of many chemical process operating company executives. Most businesses are thoroughly scrutinizing their costs to a degree unachieved for many years, with obviously good results.

Can, however, chemical processing plant costs be cut to any important degree? Many operating company people think so. Ideas include trimming extra-capacity intentionally or unconsciously specified in plant equipment items, better positioning of equipment to eliminate costly piping, and simply having purchasing agents push harder for lower equipment prices.

The first two of these — engineering approaches — offer possibilities for more efficient design or, if one is unlucky, additional bottlenecks. The purchasing agent approach, offering quick advantages but quality risks, carries with it a real possibility of economic harm to an industry not fully recovered from the expansion cut-back begun during the 1958 recession.

How is management going about trimming "fat" from conventional process plant design? One company is thinking about a policy which would bring about clearer and earlier recognition and evaluation of intentional over-capacity points in its plant designs. Under such policy, designers would make their normal decisions as to where they would intentionally install over-capacity, just as in the past, but would append to their designs indications of exactly where more-than-minimum capacity had been provided, reasons why, and estimated extra-capital requirements for the recommended over-capacity. With such design reports, management could literally tally two sets of plant costs: the usual, and a special "stripped-down" version.

Capacity in Escrow

Why, with such a system, wouldn't it be easy for management to just authorize the minimum version — and save money? In cases where capacity is intentionally added to provide for relatively quick, and low cost expansion of the entire plant's capacity at a later date, such decision can be based on forecasts of the market demand for the plant's product.

If product demand is almost certain to rise over a matter of months, then over-sizing of complicated machines such as compressors at time of original design can be only a matter of common sense. For many product lines, however, money spent now on speculative overdesign may not be put to real use for years.

If equipment over-sizing is undertaken, on the other hand, for assurance against materials and energy imbalances or the effect of unpredictable intermediate-product compositions in various related segments of the plant, then great care must be taken to avoid making design safety factor cut-backs that might result in unstable operation and/or expensive-to-correct production bottlenecks.

How It Goes

As an example, take a hypothetical processing plant comprising a series of closely interrelated steps, or units. Assume that in the design of the plant, a separate specialist has basic responsibility for each of the units.

Under "cut-back" policies, Unit "A" designer trims his heat requirements, pipeline diameters, and pump sizes to an utter minimum. Designer of Unit "B" does the same, but may have greater worries because his unit depends on the performance of Unit "A" to deliver materials at assumed flow rates, temperatures, and compositions.

Ultimately, our hypothetical plant is designed, built, and started up. It turns out that Unit "B" malfunctions because Unit "A" does not move its material fast enough, does not provide enough heat to material, and delivers material of different composition than assumed by Designer of Unit "B." Unfortunately, the trouble is not easily corrected as the heat exchangers, pumps, and other equipment in Unit "A" are already operating at top capacity.

If it could have been predicted in advance that bottlenecks were almost certain to occur in Unit "A" (because of inadequate data) it would have been a good deal cheaper to have provided from the beginning "oversized" equipment to take care of this likelihood. But it frequently turns out to be cheaper to patch up Unit "A" during the plant "run-in" period, than to have provided over-sized equipment for *most* of the series of units, simply because no one could be absolutely sure where bottlenecks are likely to turn up.

Closely akin to trimming over-capacity is the matter of more carefully spacing equipment to minimize costly piping runs. Other benefits are reduction of material-in-transit, and improved access for operating and maintenance.

Best approach to solutions of problems such as these would appear to be in closer coordination among those responsible for development and

To page 86

Anti-Chemicals Cannons Keep Roaring..

A Poison Death For All of Us?

Time to Awake To New Threat

BY JACK MABLEY

Jack Mabley's Story

HAVE you had your chemicals today? Your DDT, aminotriazole, chlorine, diethylstilbestrol, fluoride, formaldehyde, strontium 90?

You don't really know. None of us do. The U.S. government doesn't know. But it's safe to say that most of us had a small dose of some poison for breakfast, lunch, dinner, or at all three.

Probably it hasn't hurt us —yet. That is, we think it hasn't.

Some of it is just storing up in our livers and blood and organs.

We don't really know when there will be a large enough accumulation to start cancer or arthritis or a liver ailment or epilepsy or degenerative diseases.

• • •

SOME thoughtful people are getting very alarmed about the chemicals in our air, water and food. There is no question that many of them are poisons.

There simply has been no adequate research on the cumulative effect of the poisons. There are alarming signs.

Man's life span has increased, but it is a misleading statistic. It reflects better care of babies. In America today life expectancy at birth is near the best in any civilized nation. But at 40, it is near the bottom.

1 in 3 Have Form of Cancer

Today one person in every three will develop cancer in some form before he dies. In 1940 the estimate was one in four.

There has been a progressive deterioration of our national health, and it coincides with the introduction of chemical poisons on a mass basis in the growing and preparation of food and drink.

Dr. W. Coda Martin, president of the American Academy of Nutrition, says there are 704 different chemical compounds used in foods. He is convinced they can "over a long period of time cause serious tissue damage, which inevitably terminates in a degenerative disease."

• • •

CHEMICALS, bleaches, preservatives, additives, dyes, adulterants, and other substances are in prepared foods. Poisons are used on fruits and vegetables to kill insects. Water contains at least two chemicals, and the air, of course, has a quantity of the highly dangerous strontium 90.

The danger lies in our ignorance of the consequences of year-in and year-out consumption of these chemicals.

We can't measure the danger because most chemicals have been in use only since World War II, and it may take 15, 20, or 25 years for a fatal dose of chemicals to accumulate.

Also chemicals may be poisonous to one person's system and relatively harmless to another's.

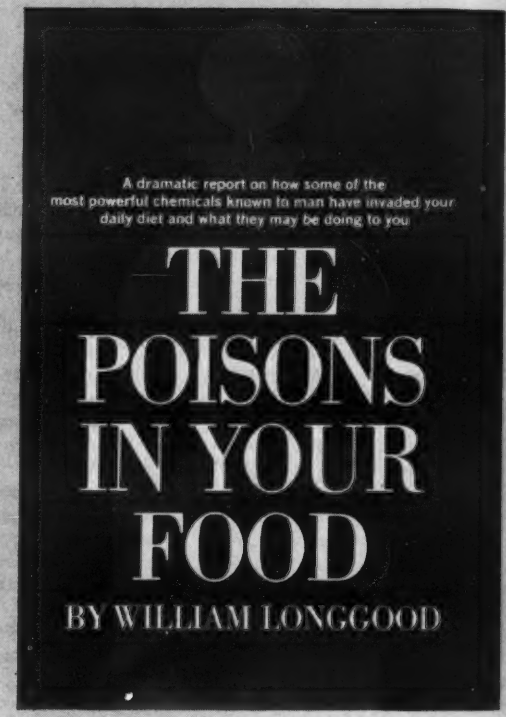
Research Efforts Are Overwhelmed

The federal Food and Drug Administration tries valiantly to do research, but it is overwhelmed with the day-to-day mechanics of operation.

In 1961 it has budgeted $2.9 million for research on these poisons. For comparison, the government is allocating $139.3 million for agricultural research, to help food growers.

Every person reading these words is being slowly poisoned. Nobody knows how slowly. We had better find out, and find out soon.

This column by Jack Mabley ran in the March 18, 1960 edition of the CHICAGO DAILY NEWS. It appears through permission of the author


A dramatic report on how some of the most powerful chemicals known to man have invaded your daily diet and what they may be doing to you
THE POISONS IN YOUR FOOD
BY WILLIAM LONGGOOD

This reproduction of the cover jacket of "The Poisons In Your Food," by William Longgood, appears with permission of the publisher, Simon and Schuster, Inc.

CPI Must 'Break Silence'

Hysterical and misleading information in the press and elsewhere must be fought openly, with scientific truths, to reclaim public faith

GORDON WEYERMULLER, Associate Editor

Months in the Making

THE STORY on this page was not a spur of the moment thing. Several months ago the editor who wrote the story, Gordon Weyermuller, spent a day at the Bushy Run Laboratories of Mellon Institute near Pittsburgh. Here he saw firsthand the thorough and exhaustive tests conducted to assure the safety of chemicals made by Union Carbide Corp. From this visit and others in various parts of the country stemmed the story in our March 1960 issue, giving the comments of seven of the country's outstanding toxicologists on the Food Additives Amendment. The present article seemed an obvious follow-up in answer to Jack Mabley's column, "A Poison Death For All of Us?" Valuable assistance in the preparation of the story was given by another one of our editors, George Bangs, who wrote the article on packaging and the Food Additives Admendment in our December 1959 issue, after extensive interview and survey.

The chemical industry has an obligation to challenge such articles as that reprinted on the opposite page. Many feel that the chemical industry has adopted a pussy-footing, Milquetoast attitude in failing to speak up and discredit such one-sided, misleading statements. It should tell more effectively the dramatic story of what it has done to bring us the world's safest, most healthful and most abundant food supply — and tell how it has saved millions of American lives.

For example, just one chemical, Vitamin B-12, is estimated to save each year the lives of more than 50,000 Americans suffering from pernicious anemia. Addition of the B vitamins, in the form of thiamine, riboflavin and niacin along with iron and calcium, provides enriched bread which has resulted in practically wiping out pellagra and improving the well being of everyone.

Chemical Story Not Told

Certainly high credit is due such organizations as the Manufacturing Chemists' Association, the Synthetic Organic Chemical Manufacturers' Association and the National Agricultural Chemicals Association for their excellent work in assembling information on how the chemical industry has made human life better. Unhappily, such information has not been used when and where it was needed.

When various issues arise in discussions on unduly restrictive administration of the Food Additives Amendment, or in such occurrences as the 'Cranberry Scare,' chemical management has too often 'put the damper' on those scientists in their own companies who would speak up in defense of the chemical industry. They seem afraid of 'stirring things up.'

During the recent Chemical Progress Week a golden opportunity was missed to fight 'tooth and nail,' point by point, the untrue statements that have been made about chemical additives in food.

Is Mabley Misinformed?

Let's examine Mr. Mabley's story, "A Poison Death For All of Us?" Much of his article is apparently based on the book, "The Poisons in Your Food," by William Longgood.*

First of all, let us say that we don't blame Mr. Mabley for his lack of understanding of the complex subject of his article. He is not a chemist and doesn't profess to be one. Many of his readers, however, believe implicitly what he says.

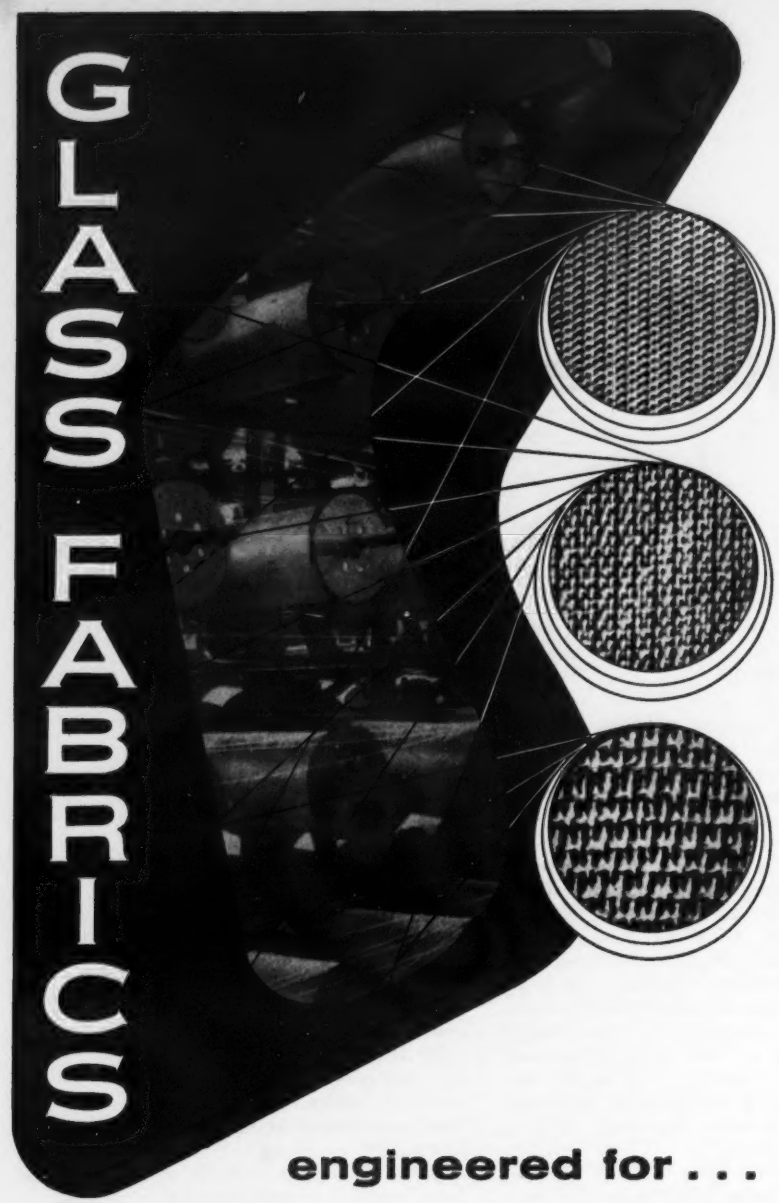
He speaks about the addition of chemicals to foods — without realizing that foods themselves are chemicals. We know that foods are composed of such chemical compounds as proteins, carbohydrates, fats, minerals, vitamins and water. A balance of these chemicals is necessary for our well being. Such a balance was not generally obtained in our diets before the age of the food technologist and the food chemist.

Many of the ingredients of food, natural as well as synthetic, would be poisons if isolated and taken by themselves in substantial quantities. Such is true of some of the ingredients of natural grape juice.

We also know that a small amount of potassium iodide in table salt is very effective in preventing goiter. Should the fact that potassium iodide or iodine is poisonous if taken in sufficient quantities deter us from using it beneficially in table salt.

Mr. Mabley speaks of at least two chemicals being in water. Actually there are many chemicals in water, and untreated water certainly has the most and usually the ones that are potentially harmful. Would Mr. Mabley eliminate

*See p. 9 for further comment on this book.



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Check 1775 opposite last page.

chlorine from water and subject us to a host of infectious diseases? He must be thinking of a chlorine gas attack in World War I rather than the very small quantity of chlorine dissolved in water.

Actually, contaminated impure water was one of the scourges of mankind, having resulted in countless deaths, before the emergence of the chemical industry.

One fact that Mr. Mabley should know is that only one death has been reported from ingestion of a chemical additive in food, and this in 1959 from the *misuse* of sodium nitrite in fish. This can be contrasted to the countless thousands of lives that have been saved through the use of chemicals in processing food. The chemical industry has for years conducted exhaustive toxicological tests, with animals and in other ways, to check the safety of chemicals. (See comments of toxicologists, page 28, March 1960 CP.) As more is learned, changes are made to make such tests even more effective.

It would be extremely harmful to health to ban chemicals from food. That is certainly known. It is like saying that surgeons could save countless lives by stopping all operations because they might be hazardous. The correct thing in either case is to do what our present knowledge tells us will be best for the public.

'U.S. Food Supply Safest in World': Benson

One of the marvels of our age is the availability of milk in pure and wholesome form to large cities in any quantity desired. This would not be possible without chemicals. From the moment the cow enters the milking parlor until the cold milk is poured from a carton, chemical sanitizers keep it germ-free.

Were it not for chemicals such as insulin, the diabetic would not be able to live a near normal life. Were it not for artificial sweeteners, he would not be able to really enjoy eating.

In a recent statement, Secretary of Agriculture Ezra Taft Benson said, "Our food supply in the United States is the safest, cleanest and most wholesome in the world . . . The Department of Agriculture strongly endorses the safe use of carefully tested chemicals as required to maintain the excellence, variety and economy of the foods we eat."

Mr. Benson continues, "We cannot continue to produce adequate amounts of safe and wholesome foods without chemicals. Abandoning their use on farms and in the food industry would result in immediate decline in quantity and overall quality of our food supply. The use of chemicals in foods themselves is as old as the practice of preserving meat with salt . . . and as new as the addition of thiamine to bread."

The chemical industry plays a major role in the production of good health. From 1900 to 1958, life expectancy in the United States increased from 47.3 years to 69.5 years. Chemotherapy played a major role in this 22-year lengthening of life.

Much of the misunderstanding that has arisen on the part of people such as Mr. Longgood has come about because of lack of elementary knowledge of what a chemical is, an archaic idea of not tampering with nature, and a basic distrust of science.

Take, for example, the widely prevalent idea that a natural or organic fertilizer is far better than a synthetic fertilizer. Both are composed of chemicals. Advantage of the synthetic is that it can be adjusted to meet the deficiencies of a specific soil.

Another erroneous idea held not only by Mr. Longgood and Mr. Mabley, but by some responsible government officials as well, is that if any quantity of a chemical is harmful, it should not be used at all. Most any medicine is harmful and many can cause death if used

must tell it

in much larger doses than prescribed. The same holds true for chemical additives in foods. A small portion of a chemical in food may be extremely helpful whereas the same chemical taken by itself in large quantities might be very harmful.

It is interesting to note that the FDA was not in favor of a no-tolerance-level provision for carcinogens. It was inserted only at the insistence of Rep. James J. Delaney (D., N.Y.). His post on the powerful House Rules Committee gave him the power to block passage of the whole Amendment if he didn't get his way. One of the approaches that holds the most promise for the conquest of cancer is that of chemotherapy.

Needed: Aggressive Group and Individual Effort

The chemical industry has a fascinating story to tell. The question is how to tell it more effectively. Certain chemical companies and organizations have done much good work in this area. On the whole, however, the public has a distorted idea of the chemical industry on such things as food additives.

First, steps should be taken to actively and effectively combat erroneous, misleading, biased information on a national or local level. If a columnist or commentator comes out with a blast against chemicals, equal space or time should be obtained to refute the false information. Men within companies should be free to speak on the issues as they see them.

Next, the chemical industry should take the offensive in telling the great story of how chemicals have saved millions of lives. This can be done on radio, television, talks, in the daily press and in magazines. Lawmakers in Washington, along with Government agencies concerned with the problem, should be contacted. Members of Congress should be asked to extend to March 6, 1962, the effective date of the Food Additives Law for additives in general use prior to passage of the law to allow more time for testing.

Chemical leaders should make the unscientific and ill-considered campaign against chemicals that has been conducted by Secretary Flemming an election issue. After all, the national election is not far off. There's good grist for the mill here.

The men in the chemical industry are the ones who know the facts, and if they are not presented to the public, great harm can result. Research can be hampered and future benefits from use of chemicals curtailed. A situation can arise like that of around World War I when the chemical industry was falsely accused of wanting war in order to increase profits from sale of explosives. The fact that the chemical industry makes much more money in peacetime on chemicals that end up in consumer goods was obscured.

For our part, CHEMICAL PROCESSING has carried two major articles on the Food Additives Amendment in recent issues — one on packaging in December 1959, and one giving comments of leading toxicologists in March 1960.

Our associate publication, FOOD PROCESSING, is waging a campaign to restore sanity to food safety from a legislative standpoint by modifying the Delaney Clause and in other ways, and has spoken out strongly against the recent untimely and ill-considered action of the government.

Also, another of our associate publications soon to appear, QUEST, will provide the chemical industry with a public relations medium to tell the real story of chemicals to leaders in our country who mold public opinion.

However, it will be the informed, vocal members of the chemical industry — slugging it out locally, regionally and nationally — who will be the front-line troops in this battle to reclaim for the industry the public faith it rightfully deserves.

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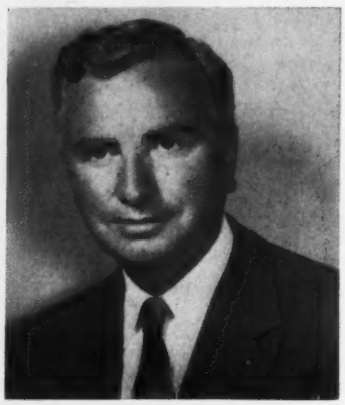
Check 1776 opposite last page.

CANADA — U.S. Common Market

. . . a proposed program for survival in a world increasingly dedicated to the free-trade-group concept



JOHN T. CONNOR
President, Merck & Co., Inc.
and
Chairman of the Board
Manufacturing Chemists' Association, Inc.

JOHN T. CONNOR is a graduate of Syracuse University and Harvard Law School. For several years he was associated with the New York law firm of Craveth, de Gersdorff, Swaine and Wood.

In 1942 Mr. Connor was appointed general counsel of the Office of Scientific Research and Development. For this work he received a Presidential Certificate of Merit. He went on active duty with the U.S. Marine Corps in 1944 as an air-combat intelligence officer. Upon his return in 1945 he became counsel to the new Office of Naval Research, and then special assistant to Navy Secretary James Forrestal.

Mr. Connor joined Merck in 1947 as general attorney. He was appointed secretary and counsel of the company later that year and vice president in 1950. He was elected president in 1955.

The time may have come when trade between the chemical industries of Canada and the U.S. should no longer be conducted on a multilateral, most-favored-nation basis. Should we not examine the possibilities of operating on a bilateral basis, with preferential and exclusive treatment being given to each other on tariffs, quotas and other trade restrictions?

In this era it is questionable whether free world trade can be fostered only by a multination approach looking to the gradual reduction and ultimate elimination of tariff duties on a most-favored-nation basis. The up-hill struggle to achieve sound and effective world-trading arrangements since the end of World War II has not brought the goal of world free trade within reach. Low tariff rates mean little in the light of the trend toward restrictive import quotas in many nations.

Probably the most significant single event making the most-favored-nation approach obsolete was the rise of the common-market concept. As in so many other things in today's world, the Communists led the way in their development of the Sino-Soviet trade bloc.

Now six European nations have banded together economically in the European Common Market. Seven others, including Great Britain, are in the process of forming the so-called Outer Seven free-trade area. This is to say, free trade with each other, but not the rest of the world. This will have some as-yet-undetermined effect on Empire preference. Important Latin American countries just this month negotiated a 15-year agreement for gradual removal of restrictions among themselves.

Growing Competition

The competitive situation for both Canada and the U.S. is now changing rapidly. The principal cause for the change lies in the kind of price competition we are meeting, both at home and abroad, for many of our products. Low-cost producing countries are beginning to dominate markets with products priced below minimum levels necessary for Canadian and American producers.

U.S. exports have declined approximately 30% in the past 18 months. Had it not been for the foreign-economic-aid program and heavy export subsidies, the decrease would have been greater. In the first quarter of 1959, we paid out $864 million more than we received from foreign transactions. This deficit is 50% larger than that for the first quarter of 1958 and the highest in 60 years. Meanwhile, the exports of Britain, France, Italy, Germany and Japan have increased.

There is only one other country of first rank in world trade beginning to experience the same difficulty—Canada. True, her exports in 1959 showed a slight increase over 1958. This however, was caused by an increase in exports to the U.S. (traditionally the recipient of about 3/5 of all Canadian exports).

But this is only part of the story. Equally critical, if not more so, is the threat developing in our home markets. As just one example, our drug industry has been hard-hit at home by foreign competition with very little public notice. Domestic sales of bulk medicinal chemicals such as vitamins and antibiotics have suffered badly during the last two years.

This is because prices, charged for similar products imported from Europe, Japan and Australia have been consistently below the prices we quote—a direct result of our higher labor and overhead costs. Foreign manufacturers apparently can import over the U.S. tariffs and still undersell domestic products.

Canadian manufacturers suffer in a similar way. To be protected from lower-labor-cost competition from abroad, a Canadian company must first

build a plant and show that the cost content of the product produced is over 25% Canadian. Then, with no protection from dumped imports, the company must capture at least 10% of the Canadian market.

Having done these things, application is made to the Canadian Government which, in turn, writes the importers in the business for their comments. If no rebuttal is forthcoming, the product is declared "of a class or kind made in Canada" and a ruling is published.

Finally, there is a 21-day grace period. During this time any importer may bring in (at the old rate of duty, and free of any antidumping restrictions) unlimited quantities of the product in question. This is often done in amounts sufficient to supply the Canadian market for some time.

Briefly then, we have the same situation in both our countries. The peoples of Canada and the U.S. are enjoying a boom year in almost every aspect of economic life. However, the changing export-trade and home-market-competition factors threaten the basic economic structure of our two nations.

A Solution

If we go our separate ways, which at least has the appeal of simplicity, we shall doubtless lose many of our foreign markets, most of the goodwill earned during and after two world wars, and all or most of the benefits from $50 or $60 billion worth of foreign aid.

We can, on the other hand, try to meet head-on the new competition arising in the Soviet Bloc, the European Common Market, the Outer Seven, the Latin American Bloc, and other regional-trading groups, present or prospective, by attempting to work out a joint approach, strictly on a bilateral basis. Such a more sophisticated approach will require more understanding by the people of both countries.

A program of this type would be simply an extension of our mutual way of life into still another area. Putting it another way, we seem to be in the same boat, so why not start rowing in the same direction?

Even in the absence of any formal regional-trade arrangement, trade relations between Canada and the United States have grown steadily over the years. Since Canada became a nation in 1867, trade by each of our countries with overseas nations has expanded 35 times, while transborder trade between our two countries has expanded 80 times.

As a first stroke, the chemical industries in Canada and the U.S. could establish a top-level committee. This committee would sponsor and guide a study of means for removing chemical trade barriers of all kinds, on an exclusive and bilateral basis.

A study group of this type might be composed of three representatives each from both nations. It might make use of staff help available through a contract with the Private Planning Association of Canada, the National Planning Association in the U.S., or both.

While the necessary studies and negotiations proceeded, we would continue to take necessary remedial actions for pressing current problems within each country on a unilateral basis.

For example, there is a Canadian chemical study of classifications and rates now in process. There would cer-

To page 92

☆ A CP FEATURE

MATERIAL HANDLING
PACKAGING
and shipping

VIA

Starting on the next page is a 34-page section jam-packed with ideas, techniques, developments and literature to help you "efficientize" handling, packaging and transporting of your chemical products. Here's a quick look at some of the highlights:

Piggyback, Fishyback, Birdyback—Better keep tabs on fast-moving containerization ideas because they promise big freight savings 28

Printing on Polyethylene Costly?—Borden Chemical slashes 70% from tab for decorating their squeeze bottles 33

Feeders Modernize Vinyl Scrap Recovery —Compact, low-cost installation doubles capacity and shaves 60% from operating expense 35

Resin Bagging Change Pays Off—Neville Chemical saves $15,000/yr in labor alone; gets less weight variation, more uniform fill and tighter bag 36

Closed-circuit Pneumatic Conveying—Maybe movement of material under an inert, controlled atmosphere is what you need. Here's a checklist of why's, where's, when's ... and how W. R. Grace uses the technique 39

Epoxy/Glass-fiber Cargo Carrier—Bulk 20-ton-capacity unit being evaluated for use on rail, highway and motor carrier, chemical resistance big factor 54

It's Wirebound for General Chemical's Acids—Experience so far with new lightweight carboys indicate lower maintenance, less storage space needs 58

Current Literature—Brief reviews of reading selected as particularly helpful to those interested in material handling, packaging and shipping 62

Flip page to begin Feature ⟶

☆ A CP FEATURE
MATERIAL HANDLING
PACKAGING
and shipping
VIA TRUCK

Piggyback, Fishyback, Birdyback Trim Fat from Freight Budgets

A fast-growing list of such containerization concepts for efficient movement are rapidly taking hold in a more competitive climate in the transportation industries

DANA B. BERG
Executive Editor

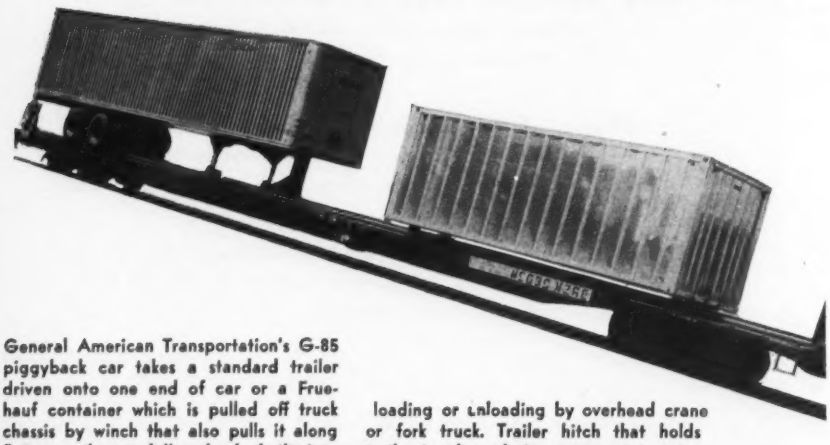
All is *not* quiet on the transportation front . . . and the alert CPI shipper is reaping savings from the revolution now under way. Fast-breaking containerization developments—piggyback, fishyback and birdyback—and a reawakening freer competition among carriers give glimpses into a future of minimum-cost movement of products, coordinated to combine the best features of nighway, rail, water and air transport.

Transportation is a whopping item to the chemical industry, standing in third place as an expense . . . exceeded only by cost of goods purchased and by payrolls. In some companies it even exceeds payrolls in size. Costs of transportation in the industry are estimated to run anywhere between 6½ and 25% of total sales—and there are indeed few clustered around this lower figure.

About nine percent of the total gross revenue of U. S. railroads is derived from transportation of chemical products. The Interstate Commerce Commission reports that 20½% of "for hire" tank truck revenues is earned in chemical transportation.

It's small wonder that any ideas to whittle down freight costs bring a buzz to traffic manager circles. This buzzing has recently become a roar among these men whose traffic decisions can mean savings or losses to their companies of hundreds of thousands of dollars a year. There's a growing swell of rate reductions by railroads and other carriers, paced by increasing availability of trailer-on-flatcar (TOFC) service on various roads.

As Union Carbide general traffic manager Charles Beard says, "During the past fourteen years, transportation costs have been going up 'across the board' by leaps and bounds. Now, various plans of piggyback and container service bid fair to give us our first opportunity in years to slice them by chunks . . . and by reasonably big chunks at that!"



General American Transportation's G-85 piggyback car takes a standard trailer driven onto one end of car or a Fruehauf container which is pulled off truck chassis by winch that also pulls it along flatcar rails on dolly wheels built into container. Container is also adaptable to loading or unloading by overhead crane or fork truck. Trailer hitch that holds trailer in place during transport is automatic.

Examples of Savings

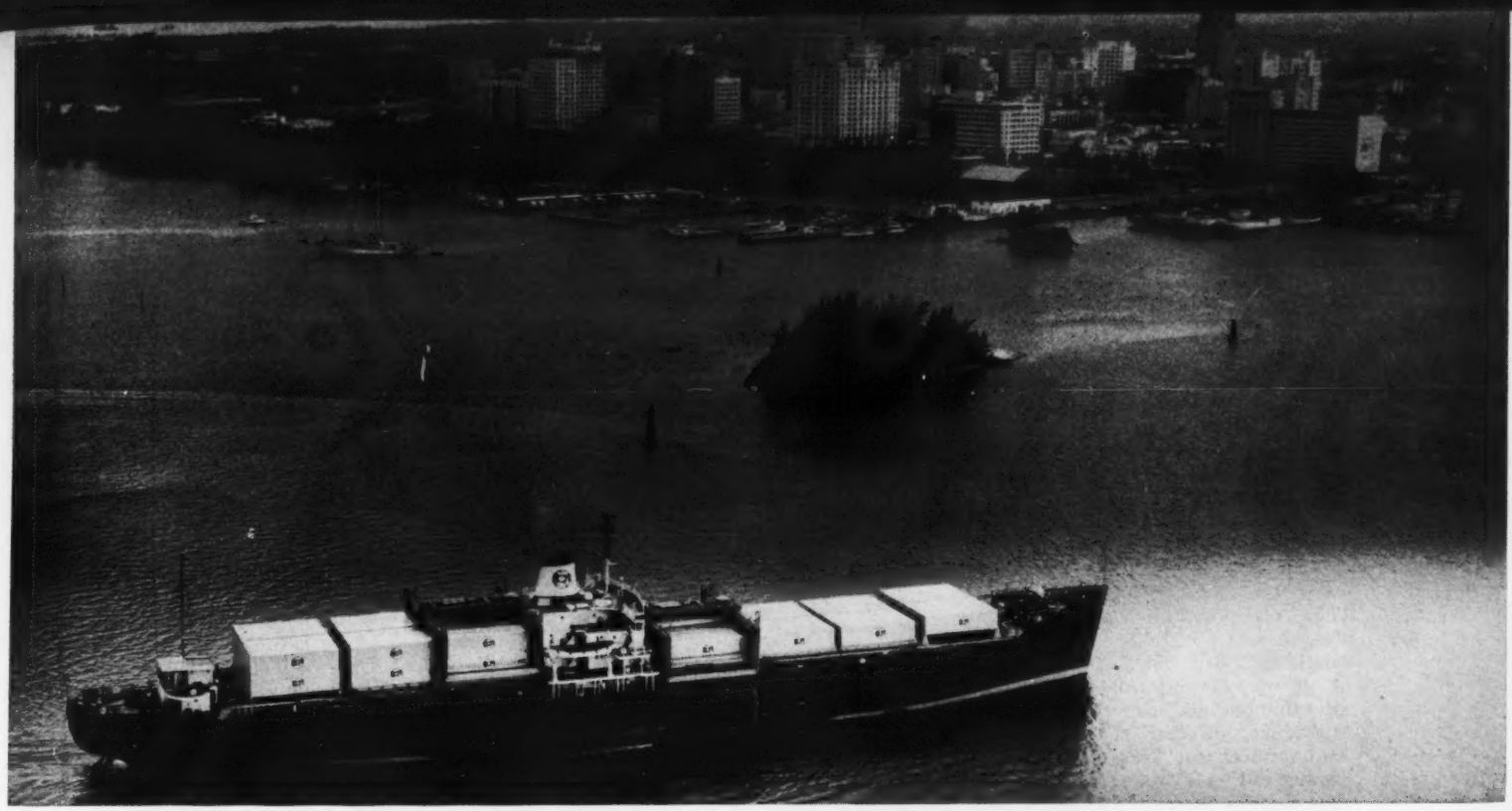
E. J. Walz, manager of motor transportation for International Minerals & Chemicals, reports a saving of more than $1300 a month by moving 320,000 lbs in that period of Accent food seasoning compound via piggyback Plan 2 instead of truck from San Jose, Calif., to Chicago. (See "Piggyback Plans" box on page 30.). He anticipates that the volume of this commodity moving by piggyback will increase from 30% in 1959 to 40% in 1960 and 70% in 1965.

Stauffer's Victor Chemical Division averages a saving of $100 a trailer load in shipping about 50 trailer-loads a month to the Eastern Seaboard via Plan 3, says Walter Saaby, Stauffer's director of transportation.

Similar savings per load are reported by Jim Russell, division traffic manager of American Cyanamid, who uses Plan 3 to connect the New York City area with Chicago.

Union Carbide hopes to save about $3200 a month by piggybacking about 35 trailer-loads a month from the New York area to Chicago under Plan 3. This despite the fact that UCC leases its trailers under the relatively expensive trip rate. Assurance of return loads would permit them to set up a mush less expensive long-term lease.

Irby O'Brien, assistant general traffic manager of Monsanto, uses Plan 3 piggybacking from St. Louis and East St. Louis to eastern destinations, and from Springfield, Mass., to Chicago and St. Louis. Plan 2 is used only occasionally; use of Plan 3 runs $45 to $125 less per trailer than Plan 2 on these runs. Monsanto moves approximately 65% of its traffic by Plan 3—between those points



One of Pan-Atlantic S.S. Corporation's six container-ships in harbor at Miami. Each ship in this Sea-Land Service holds 226 containers, some of which can be seen on deck, others of which are stacked five-deep in seven holds. Sea-Land serves the Eastern Seaboard, around to the Gulf and Puerto Rico . . . boasts a 60-hr run from New York City to Miami. Planning is under way for intercoastal Panama Canal shipping by 1961, in ships holding some 500 containers.

where such rates are in effect —averaging about 100,000 car-miles annually.

Mr. O'Brien has previously indicated substantial savings of Plan 3 over common carrier trucking between East St. Louis and the New York area. Common carrier truckload rate is $1.40 cwt while Plan 3 costs (including railroad tariff, trailer leasing, origin loading and trucking, and destination unloading and trucking) run $1.06 cwt for a 70,000-lb (two-trailer) flatcar load. Advantages of piggybacking in this haul diminish with decreasing load until, according to Mr. O'Brien's study, the costs equalize at a 53,000-lb load.

An article in the University of Washington Business Review points out how two trailers carrying a total of 50,000 lb can be piggybacked at $2.12 cwt between Chicago and the Pacific Northwest . . . vs. $3.62 cwt by conventional movement. (The $2.12 includes costs of leasing trailers and flatcars, terminal charges, and the railroad tariff of $924 per trailer under Plan 4.) Larger loads would favor piggyback even more since, in this plan as in Plan 3, tariff is a flat charge per trailer.

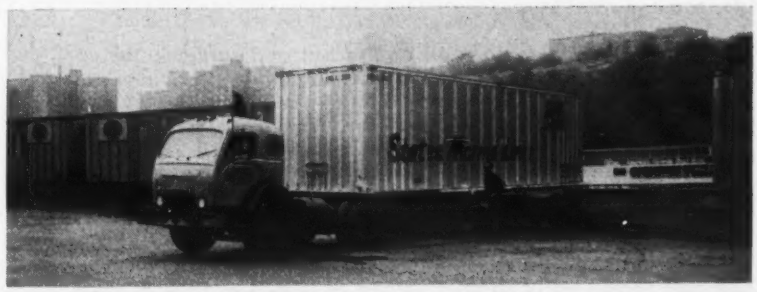
Where Savings Arise

Such economies are possible in combining the lower cost railroad movement for the long run (some say piggyback should be looked into for hauls of 100 miles or more) with the flexible truck movement at either end . . . without having to unload the freight piece by piece or pallet by pallet when transferring from one carrier to another.

And this older conventional freight-handling can be costly, as pointed out in a report of of the Army Transportation Corps. This indicates that piggybacking of a 10-ton or larger load in a trailer can mean a transfer saving of $3.50 per trailer at each terminal. This does not include damage claims or pilferage, which can be cut sizeably by containerized shipping and transfer.

The report further figures approximate ton-mile costs of piggybacking, assuming an 8% profit margin, to be 2.21c for a 200-mile haul, 1.57c for 400 miles, 1.36c for 600 miles. These are based on a 54' flatcar carrying one trailer; the more customary two trailers on one flatcar will show even lower costs. By comparison, out-of-pocket line-haul costs for motor carriers are believed to average about 2.5c per ton-mile here, although some authorities say they are closer to 4.5c.

Piggybacking bypasses certain expensive and time-consuming yard operations for



New York Central's Flexi-Van system features side-loading of container onto a turntable of flatcar which is then swung around and locked into place. Tractor provides power for sliding container onto car. Under-construction of trailer, including wheels and axles, is detachable. Container slides over these assemblies (called "bogies") during transfer operations. States Marine, American President Lines and Transamerican Steamship Corporation have adopted Flexi-Van service for coordinated truck-rail-water containerized transport.

Piggyback Growing

From preceding page

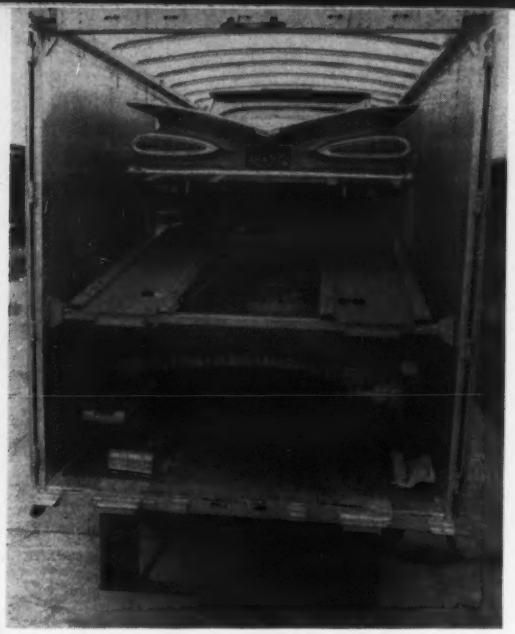
the railroad. Trucks can take the place of low-volume, high-cost switching operations in the yard as well as dock operations at shipside.

Railroads find that cars are utilized more efficiently, kept moving more and thus taking in more revenue. Some flatcars in piggyback service average over 200 miles daily. There are even instances of a 500-mile/day average. This compares with an average of 46 or 47 miles/day for all other freight cars. R. L. Milbourne, director of sales and services for New York Central's Flexi-Van services, says that his flatcars make six trips a month (about five days/trip) vs. 18.1 days/trip for boxcar. And he sees eight Flexi-Van trips every month not far off.

The Pennsylvania railroad now has a 26-hr conventional all-piggyback run from Chicago to New York.

Possibilities are that another railroad problem might be eased somewhat — empty-car movements. Approximately 40% of total railroad mileage is estimated to be such deadheading. Under piggyback Plans 3 and 4 the shipper or forwarder owns or leases equipment; the trailer only under Plan 3 and the trailer and flatcar under Plan 4. He can make use of an expensive trip lease; or he can buy the equipment outright or take a long-term lease, either of which will cost substantially less than the trip lease.

It's apparent that there will be strong economic incentive for the shipper or forwarder to avoid the trip lease where and when he can, and make all effort to line up a payload for his equipment on the return. But in the meantime, the railroad has no financial responsibility to return the



Multipurpose containers can bring major cost cuts in transportation because they have a better chance to travel loaded. Here is one such container that carries 4000 gallons of liquid in a collapsible rubber container (U.S. Rubber's Sealdtank) under two automobiles. Rubber container can be rolled up to make room for other commodities after liquid has been delivered. Motor common carriers of general commodities are restricted to carrying Sealdtanks holding up to 999 gallons only, leaving the larger capacities to the tank truck carriers (or private carriers).

PIGGYBACK PLANS

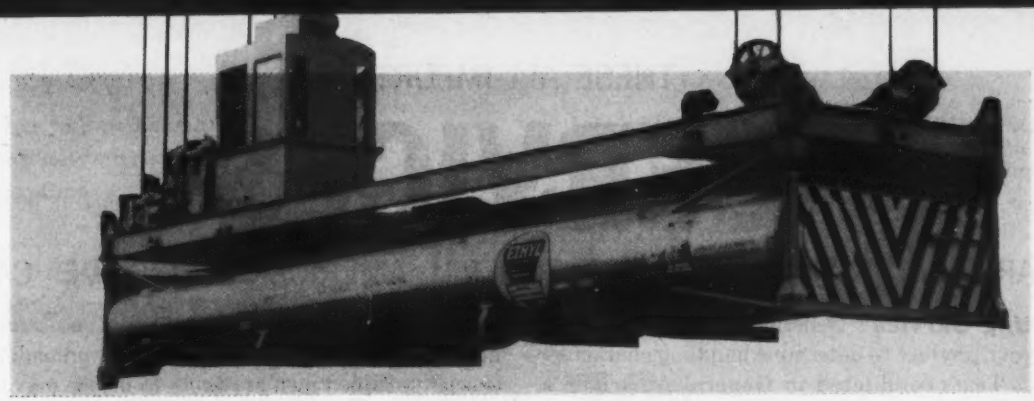
PLAN 1—Railroad carries trailers owned by common motor carrier, within only the authorized territory of the motor carrier. Trucker bills the shipper and traffic moves under one bill of lading, and under rates in regular motor carrier tariffs. Motor carrier either divides the tariff with the railroad or pays a flat fee per trailer, loaded or empty and without regard to content. This is often called "substituted service"—since TOFC (trailer-on-flatcar) service is substituted for over-the-road movement for some part of the trip.

PLAN 2—Railroad provides all equipment and services, including pickup and delivery, trailer, loading, unloading, and rail movement of trailer on railroad's flatcar. In effect, the railroad is substituting TOFC movement for boxcar. Trailers, usually owned and operated by subsidiary of the railroad, must operate within prescribed limits of railroad's authorized territory. Traffic moves under rates published by the railroads, usually matching truckers' rates between similar points.

PLAN 3—Railroad provides the flatcar and the service of putting on and taking off of shipper owned or leased trailers at ramp. Rates are generally charged as so much per trailer-load, up to a prescribed maximum, no matter what is in the trailer . . . except that there can be no more than 60% of one commodity making up one flatcar-load, and there must be a certain minimum load. Rate is a flat charge averaging 50c per car-mile, but lower volume rates are being offered shippers. The railroad has the advantage of not having to develop return traffic. Freight forwarders, whose business is to consolidate trailer loads throughout the country, see big savings in this plan. The ICC is now investigating these rates and those of Plan 4, below, which are deemed unfair by truckers.

PLAN 4—Just like plan 3, except that the shipper (or forwarder) supplies the flatcar as well as the trailer, and must pay for all loading and unloading and pickup and delivery services. Railroad furnishes only motive power and rails. Obvious targets here, as in Plan 3, are those shippers now using extensive private over-the-road carriage. Rates published average about 42c per car-mile. They are under investigation by the ICC to assure that they are compensatory to the railroads.

PLAN 5—Movement is under joint through rail-truck rates. Either railroad or trucker may solicit business; traffic moves under one bill of lading. Many railroads are steering clear of this plan, since it may mean they will be competing with other railroads in their own territories (where the trucker they have joint rates with is authorized to operate in that other railroad's territory). But this plan so far appears to meet ICC approval . . . and looks like a good bet for the ultimate in efficient, coordinated and low-cost land transportation.



Demountable pressure tanks . . . such as this one engineered by ACF for carrying Ethyl anti-knock compound, are part of the broadening containerization concept. This one replaces about forty 55-gal drums, speeds loading and unloading.

trailer (Plan 3) or the trailer and flatcar (Plan 4).

Independent shippers' cooperatives as well as the freight forwarders, will probably push this aspect hard. There will be intensive work to obtain as balanced a movement as possible from one area to another. Of course these organizations primarily are of service in consolidating loads so that no one flatcar load consists of more than 60% of one commodity — a prerequisite of the per-trailer Plan 3 and Plan 4 rates.

Growth of P B

Piggybacking as a concept is not new, but it is only in the last few years that it has really surged ahead. Total piggyback carloadings have more than tripled since 1954. In fact they increased more than 50% between 1958 and 1959, and it appears that there will be the same percentage increase between 1959 and 1960. This despite the fact that total carloadings only increased around 2% in the same period. "Distribution Age" lists 57 railroads offering one or more of the piggyback plans serving 700 ramp locations . . . compared to 37 railroads and less than 200 points four years ago. At least 52 of the roads have interline agreements through which the shipper can move goods to practically any part of the country.

This growth most certainly was pushed by the passage of the Transportation Act of 1958. This legislation gave more freedom to carriers in making rates reflecting their own inherent advantages. It reawakened a management whose incentive and imagination perhaps had been stifled by years of very strict public regulation. Rates having their roots back in an economy and competitive community not bearing any relationship to today's picture were in use (and of course still are).

These rates — often thousands of them in effect between two points on one line — had been based on a number of things, such as the specific commodity's ease or difficulty of handling, density, susceptibility to damage, etc. . . . but also on "value of service."

This "value of service" terminology is a throwback to the days when railroads represented the only way to get goods to market. The higher-priced goods got tabbed with higher rates because they could "afford it" more than bulk commodities, where transportation represents a good chunk of the selling price (and which often were products of politically powerful organizations). Truckers too have a similar complicated rate system, patterned somewhat, in concept at least, after that of the railroads.

Especially in the light of recent technical developments—containerization, unitized pallet loads, piggybacking, etc.—such rates now bear little or no relationship to *actual costs* of getting something from one place to another. With the ICC now looking more favorably on competitive rate-setting, as long as such rates can be proved compensatory, the railroads (and other carriers) find it to their advantage to spend the time and money to really determine their exact costs.*

Giving a boost to this thinking is a book published by Harvard University Press in 1959 — "The Economics of Competition in the Transportation Industries," by Meyer, Peck, Stenason and Zwick. After comprehensive calculation and analysis of actual costs, the authors strongly endorse almost complete removal of regulation in all fields except where monopolies continue to exist, i.e., overland rail carriage of a limited number of bulk commodities technologically incapable of pipeline transit, certain pipeline operations, and railroad line-haul facilities needed for piggyback (to assure equal service for all potential users).

But even these cases, say the authors, should be reviewed frequently to see if changing conditions have eliminated or reduced the need for regulation.

It's apparent that railroads are no longer a monopoly in transportation. They are now carrying less than 45% of total intercity freight, vs. more than 66% in 1946. And total intercity freight ton-miles has increased 50% since 1946. Most of the loss has been to trucking, much of it to private trucks or contract carriers.

Not that manufacturers have wanted to get into the trucking business — with its maze of union rules, ICC regulations, state and municipal ordinances, maintenance and labor costs. But common-carrier rates in many cases out of line with costs, plus the need for flexibility and speed (now being met in many cases by piggyback), forced them to set up their own fleets.

Equipment Standardization

Any new concept will bring development of different methods to do the same job. This is the case in piggybacking. There is no doubt that

*In a booklet, "Federal Transportation Policy and Program," published March 1960, the U. S. Department of Commerce takes the stand that regulation should shrink as competition grows, should be applied primarily to protect the public against monopoly abuses.

The report also states: "At a given level and structure of capital investment, efficiency requires that traffic be distributed among (the various types of) carriers in such a way that each type receives the traffic which it can carry with the least consumption of resources by the carrier for the service standards required by the user. It requires that several forms of transport be used in coordination where such a combination can produce a better service-cost result than any single form working alone."

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standardization to assure compatibility between one type of carrier and another (including ships and possibly airplanes) and between one line and another will be needed to push the concept along to its full commercial capabilities.

Much progress toward standardization of piggyback flatcars has resulted from formation of Trailer Train Company in 1956. Membership of this railroad-owned car line now includes more than twenty leading rail systems operating throughout the U.S., and accounting, in the aggregate, for over half of all piggyback traffic.

In late 1958, Trailer Train adopted as standard an 85′ flatcar of new design, capable of handling two trailers of any length up to 40′. Orders for several thousand such cars were subsequently placed with Pullman Standard and ACF Industries. (Pullman-Standard reports that they have built or received orders for 2400 85′ piggyback cars in the last 18 months.)

Other systems being used in the railroad industry include the General American Transportation Clejan and more recent G-85 systems and the Flexi-Van system, both of which are briefly described in captions with photographs accompanying this article.

The ACF retractable trailer hitch is the most widely used device for securing the trailers to the flatcars. It can be supplied on new cars or adapted to old ones. An advantage in this system is that the car can be used in conventional service when necessary. The trailer is driven on from the end of the car.

As piggybacking enters what many feel is its next logical development step — transfer of only the containers, without chassis and wheels — the need for standardization will become even more important. Various rather expensive developments in gantry and overhead cranes and oversized lift trucks are in use. In other methods, special devices on the car permit transfer without use of this type of equipment; but these are so

To page 62

Borden Chemical Company switches to new heat-and-pressure process for printing polyethylene bottles at its adhesives plant . . .

☆ A CP FEATURE
MATERIAL HANDLING
PACKAGING
and shipping
VIA TELEDYNE

Transfer Labeling of Squeeze Bottles Slashes Packaging Costs 70%

TED F. MEINHOLD, Associate Editor

Problem: Printing costs for polyethylene squeeze bottles were taking a big slice out of the budget at Borden Chemical Company's Bainbridge, New York, adhesives plant. Used to package Elmer's Glue-All, the company's popular all-purpose polyvinyl acetate type adhesive, the bottles were being farmed out for printing with Borden's single-color marketing labels by means of conventional silk screen process.

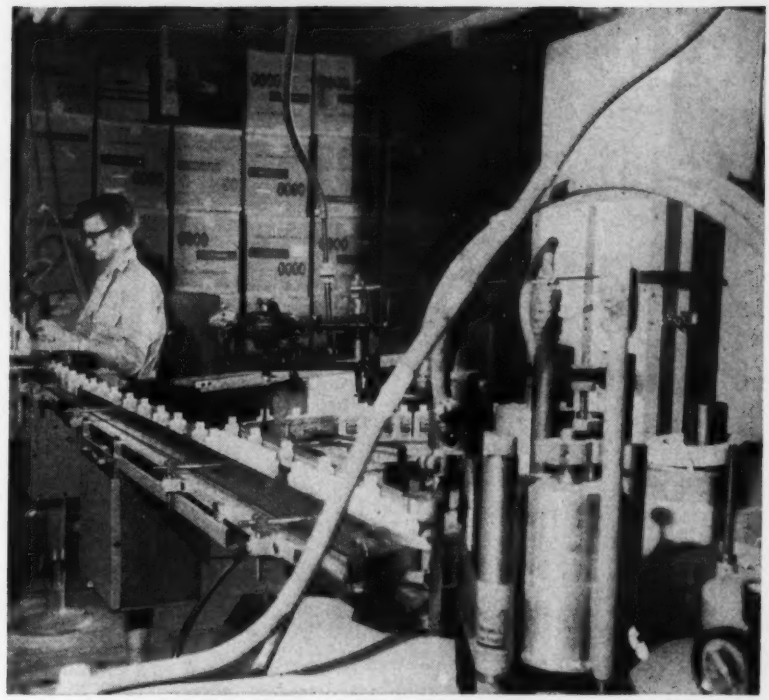
Solution: Use of a recently developed low-cost transfer labeling process was considered. A product of Dennison Manufacturing Company research, the technique can automatically decorate film, packages, and containers such as polyethylene bottles at high speeds. Labels having up to four colors can be used, if desired.

The Therimage process, as it is known, consists of coating a roll of supercalendered kraft sheet with a chemically compounded heat release material. The roll is printed on the coated side, slit, and punched for feed holes.

Finished roll is then fed through a specially designed machine which, through use of heat and pressure, separates printed layer from bodystock and bonds it to surface of item being decorated.

The equipment varies for different applications. To decorate cellophane, polyethylene, foil, or waxed paper, the unit is mounted on a package, wrapping, or bag-making machine and becomes an integral part of the equipment. Film is decorated as fast as it feeds through the packaging unit.

When decorating objects such as plastic bottles or cartons, the equipment operates

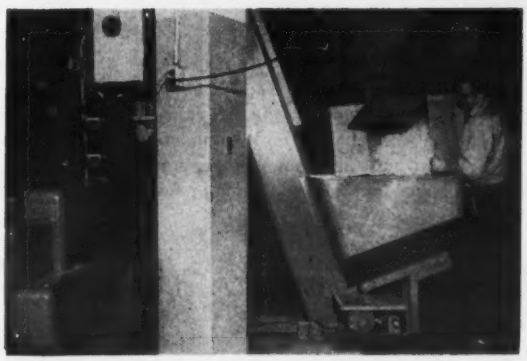


Operating entirely automatically, machine (foreground) decorates close to 100 polyethylene bottles per minute. Heat and pressure are used to transfer labels from tape to container's surface

Photos by CP Staff

Operator filling hopper of unscrambling machine. Unit automatically unscrambles bottles, places them in upright position on conveyor line (extreme left)

Decorated bottles coming out of 32-ft long post-heating oven are ready to be transferred to product filling line. Heat treating enhances label's gloss, improves mar resistance



as a complete system feeding the containers, bringing them into position, printing them, and then delivering the bottles to exit line. Containers can be decorated on two sides by using two machines in tandem.

Each machine measures about 8½ x 2½ x 3½ ft high. Electric heaters require 500 to 2500 watts. Compressed air, at 20 psi minimum, is also needed.

Borden Chemical initially contracted to have the bottle decorating job done at Dennison's Framingham, Massachusetts plant. However, as soon as initial results were in, and equipment became available, Borden installed a line of their own.

Flow Sequence

The system at Bainbridge has an in-feed and out-feed conveyor mounted in parallel. Two machines operating in tandem automatically decorate both the face and reverse sides of Borden's oval-shaped containers.

Using platens at 500-650°F, heat and mild pressure are applied to back of label paper while legend and coated side are in contact with the polyethylene bottle. This causes label to instantaneous release on to the container.

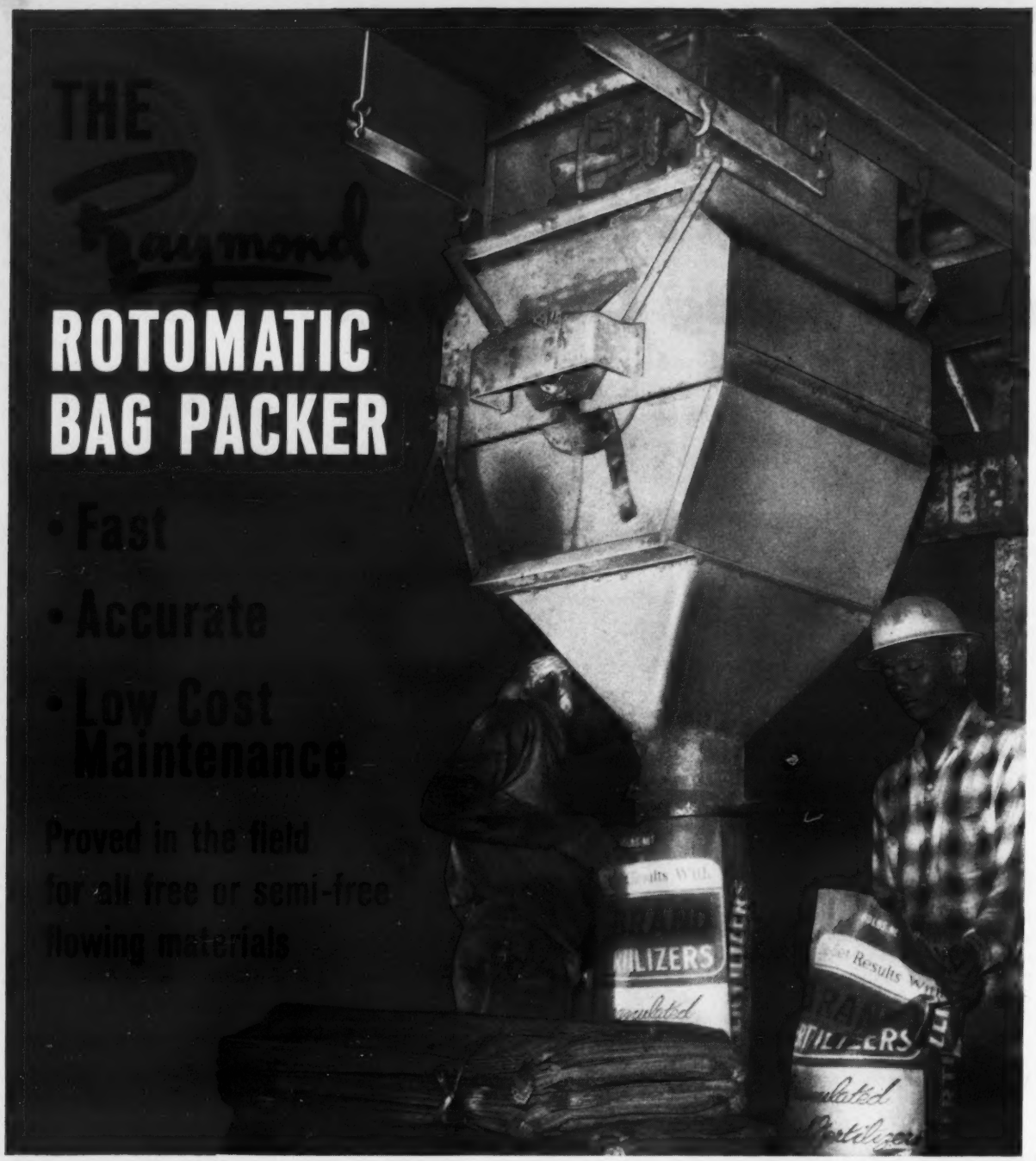
To heighten gloss, decorated bottles are conveyed through 32-ft long oven. Unit is divided into four temperature zones ranging from about 400°F at inlet to 150°F at outlet. Retention time is approximately two to four minutes.

In all cases, label stock is supplied by Dennison. Three types are currently available. Choice is governed by printing process to be used, label design, and manner in which label is to be applied.

Inasmuch as a reversal of the label occurs during transfer, it is necessary to print topside labels with reversed printing plates. Inks must also be applied in reversed order with background colors printed last. Underside labels are printed with conventional printing plates using normal sequence of ink application.

Labels are printed in rolls

To page 44



That's right! Speed, Accuracy and low-cost maintenance . . . proven in full production line operation. It's the Bag Packer that can give you new economy in your bag packing operation. The Raymond Rotomatic Packer is fully automatic, all mechanical, and requires no outside motivation such as electricity or compressed air. It is gravity operated and uses the even balance scale principle to deliver proved accuracy. Get complete details now from your Raymond representative or write

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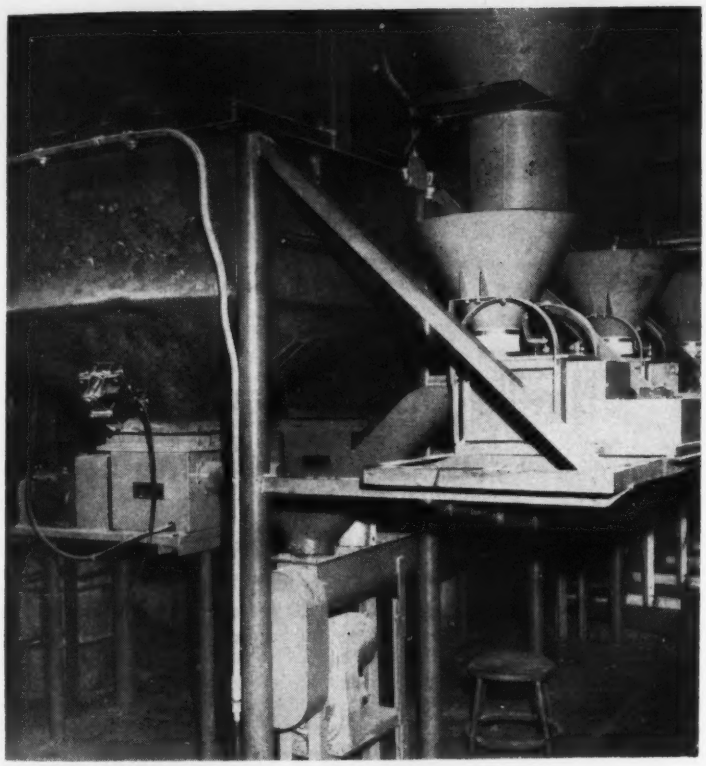
"Maker of RUGGED MULTIWALL PACKAGING for Industry"

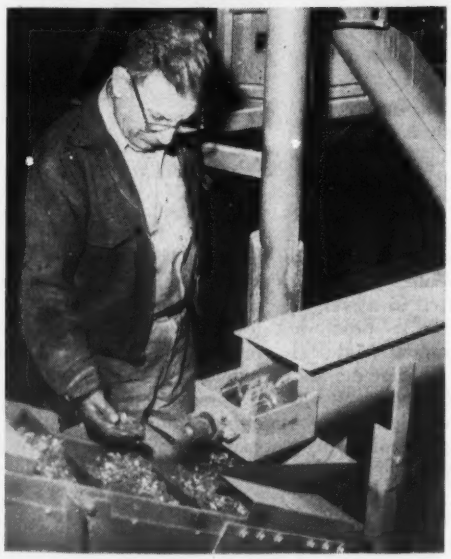
Check 1778 opposite last page.

Former method of processing vinyl plastic was inefficient and time-consuming —

Feeders boost capacity 100%, cut costs 60%

JOSEPH GRODER
Plant Manager
Supplex Company, Div. of Amerace Corporation
Garwood, New Jersey
with **CP STAFF**





▲ Installation of leaders. Two hoppers at the far right are used to feed the additives; hopper and feeder in the foreground plus three feeders under the large rectangular bins at left handle the vinyl scrap

◀ Visual, random inspection of the mixed vinyl scrap is made at exit of main screw which feeds onto a conveying belt for transportation to straining extruders

PROBLEM: Manual method of processing vinyl scrap to be used for manufacturing garden hose at Supplex Company was time-consuming and inefficient. Process started with lump-reclaimed plastic that was bale cut and then fed manually into a straining extruder. Five men were required on each of three shifts for the 24-hour-per-day operation. A means of improving and automating the system was sought.

Solution: To solve the problem, a completely new installation was designed between the straining extruder and the first entry of reclaimed scrap plastic into the process. Heart of the installation consists of four bins, six volumetric feeders and a main feeder-conveyor. All of feeders utilize the vibrating screw principle.

Process is best described by the flow of materials. Reclaimed vinyl scrap is chopped through a ¾" screen by a standard industrial granulator and fed into four bins (each bin holding plastic scrap of a particular hardness) by means of air blowers. The four bins (three rectangular and one cylindrical) are approximately 125 cu ft in volume each. The materials in the bins are fed respectively into four volumetric feeders which in turn feed the main screw feeder (6" diameter, 10' long).

Each of the four screw feeders is adjusted to deliver a specific volume of the material at a designated rate according to the formula requirements of the product being manufactured. In addition, two other volumetric screw feeders are employed to feed two powdered ingredients into the main mix, also at predetermined, automatic rates.

Physically, the six volumetric feeders are placed in opposite rows of three each, with the main screw feeder in between, perpendicular to the horizontal axes of the machines and approximately two feet below.

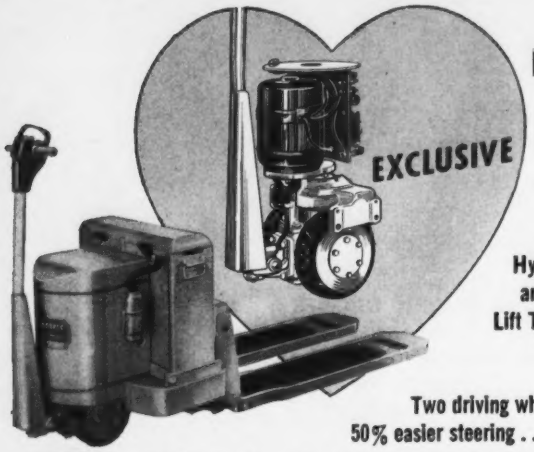
Variable-speed transmission drives are used to control rate of screw feeders. This drive can be adjusted to any desired speed from zero to maximum without stopping operation. Unit is simple and compact. Once adjusted, it operates automatically and accurately.

Main screw feeder delivers preset batches to a cleated rubber-belt conveyor which feeds straining extruders. From there the process is the same as it was previously, as follows: The strained material produced by the extruder is fed into a tape-forming extruder. The resultant tape is water-cooled and diced into ⅛" cubes which are automatically fed into shape extruders which turn out the final form.

Results: Entire screw feeder installation occupies only 60 sq ft of floor space, and was installed at a total cost, in-

To bottom of page 45

HEART OF THE HydroLectric



... THE DYNA-DUAL POWER UNIT

Compare the Hydrolectric features with any other "Driver Lead" Lift Truck. The Hydrolectric quality of construction merits your inquiry.
Two driving wheels instead of one ...
50% easier steering ... ease of maintenance.

NOTE: The Dyna-Dual Power Unit is interchangeable on all models.

A TRUCK FOR EVERY PURPOSE AND MATERIAL

LIFT TRUCKS, INC.
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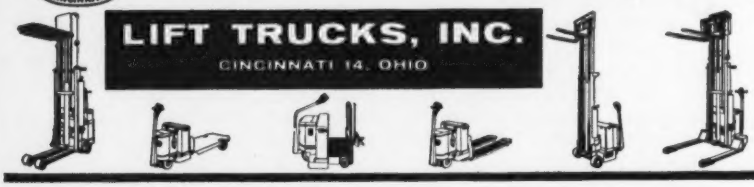

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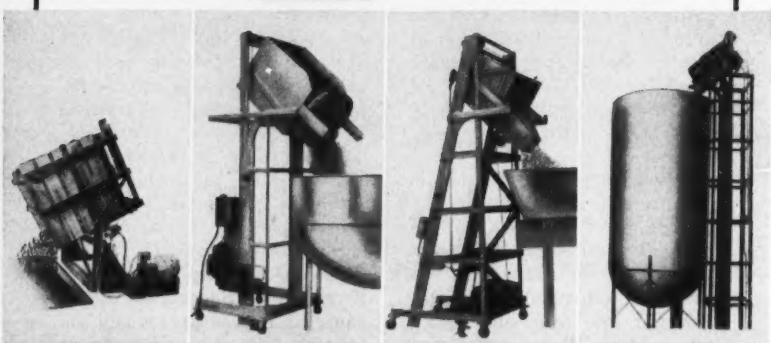
NOW YOU CAN LIFT and DUMP ANY CONTAINER



HYDRO-DUMPER
Dumps up to 4 feet. Load capacity, 6000 pounds.

JUNIOR DUMPER
Dumps up to 8 feet. Load capacity, 700 pounds.

SENIOR DUMPER
Dumps up to 20 feet. Load capacity, 4000 pounds.

VERTICAL DUMPER
Dumps to any practical height. Load capacity, 4000 pounds.

Yes, no matter what size, shape or type container you use to receive, store or process free-flowing material — or whether it's a special in-plant container — ESSEX can supply the necessary dumper.

ESSEX dumpers are flexible in design so they can be modified to suit your job conditions. For the safe, reliable, economical way to lift and dump material in any container, call upon ESSEX for the answer.

ESSEX CONVEYORS, INC.
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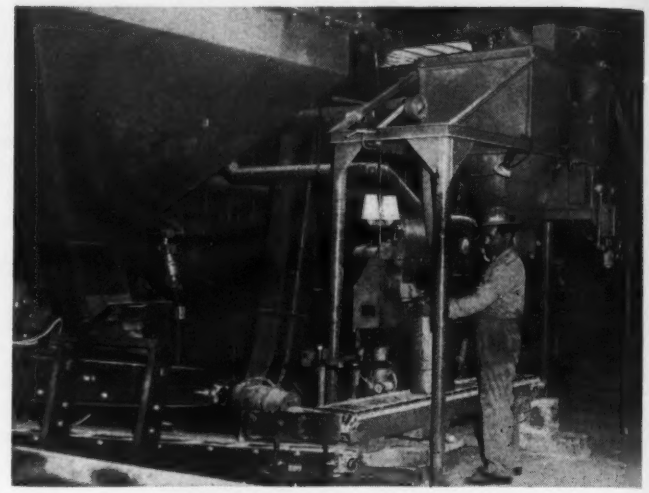
Check 1780 opposite last page.

☆ A CP FEATURE
MATERIAL HANDLING
PACKAGING
and shipping
VIA TRUCK



Entire operation of filling, sewing and palletizing bags is accomplished by one man

Neville Chemical saves $15,000/yr in bagging operation

Recently installed system also permits open-mouth bags to be used with added savings of $11.10 per thousand bags

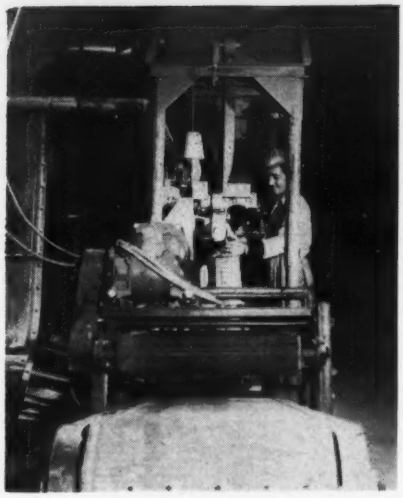
GORDON WEYERMULLER,
Associate Editor
with **H. J. SHEARER**
Plant Superintendent
and **L. J. SITOMER,**
Chief Engineer
Neville Chemical Company
Neville Island, Pa.

PROBLEM: Former method of bagging coumarone-indene and petroleum resins at Neville Chemical Company resulted in a weight variation of about plus or minus two pounds. Material was loosely packed and weights had to be adjusted by hand before shipment.

Previous bagger also presented a problem of excessive dusting. Type of bag used permitted leakage of product. Bagging system could not keep up with production. Screw-type feeder caused friction, which resulted in heat and motor burnout.

Solution: In the summer of 1959 Neville installed a different bagging system involving a number of pieces of equipment. With present setup, a Hapman flight conveyor transports resin from flaker to a "surge" or intermediate storage hopper. Next the flaked resin is moved with a L-type elevator directly to supply hopper. Proper resin level in supply hopper is maintained by a "high-low" level control on hopper.

Open-mouth-bag-filling machine, known as Kraftpacker, takes resin from supply hopper by means of a conveyor and adjustable flow gate, at a continuously controlled rate which can be varied over a



Heavy-duty rollers (foreground) flatten bag, making a neat package that is easy to palletize

wide range. Resin from supply hopper is then batch-weighed in scale buckets according to a pre-selected weight. Charge is then dumped into catch hopper and goes from there to open-mouth bags.

Open-mouth bag is taken from packer and transported by a Bagpak closer-conveyor through a mechanical sewing head. At end of closer-conveyor, a bag-turner rotates and drops the sewn bag to a horizontal position on the bag-flattening machine.

This machine has heavy-duty rollers that flatten each bag and knead the material to distribute it evenly in bag. Bag-flattener reduces bag to a dimensionally neat package and discharges it onto a gravity-wheel conveyor. This conveyor returns bag to within arm's reach of operator who then palletizes the bag. Hence, one man fills, sews and palletizes the bag.

Results: Total estimated savings of manpower achieved with new bagging system is 168 hours/week or more than $15,000/year. Present bagging system permits open-mouth bags to be used in place of former type, with an added savings of $11.10 per 1000 bags.

Another major advantage obtained with present system is that weight variation is only plus or minus two or three ounces in place of plus or minus two pounds with former method. Bag closure is tight and a neat package results. Uniform package makes palletizing easier and simplifies inventory.

Total number of bags packaged per hour is expected to be twice the number obtained with former system. Since new bagging system works on gravity-drop principle, former motor overheating problem has been eliminated.

Quality of products has been improved through avoidance of dust leakage from package. Minimum of dust in operation makes it more attractive to operators.

(Kraftpacker open-mouth bag-filling machine is product of Kraft Bag Corporation, subs. Gilman Paper Company, 630 Fifth Ave., New York 20, New York.)

Check 1781 opposite last page.

(Bagpak closer with Hoepner sewing head is product of Bagpak Division, International Paper Co., 220 East 42nd St., New York 17, N.Y.)

Check 1782 opposite last page.

(Bag-flattener is product of The Rapids-Standard Company, Inc., Rapistan Bldg., Grand Rapids 2, Mich.)

Check 1783 opposite last page.

Webster CAR PULLERS

For Quick, Economical Spotting

One-man, push-button control. Always ready, always safe. The capstans on WEBSTER Car Pullers are designed to give long life to the ropes, and provide the necessary traction for pulling the load. The high-torque, hoist-type, weatherproof motor is an integral part of the unit. Two sizes of 5,000 or 10,000 lbs. rope pull at 40 ft. per min. WEBSTER Drum-Type Car Pullers also available in sizes from 7½ up to 50 hp. Write for literature.

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Perfect and permanent roll alignment, economical operation, and minimum maintenance are built-in characteristics of WEBSTER Idlers. The balanced steel rolls have rounded edges which protect the belt and securely lock in the malleable iron roll ends. Timken tapered roller bearings are oversize to meet overloading and constant operation. Labyrinth seals of metal and felt keep grease in and dirt out. All parts interchangeable. WEBSTER Idlers will help you keep material handling costs down. Write for literature.

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For over eighty-four years WEBSTER has manufactured a complete line of standard and specialized cast and steel chains and chain attachment links for use in all industries. WEBSTER chain types include Pintle, Ley Bushed, Combination, Roller, Drag, Bevel and Roller Top Transfer. Our engineering department offers its experience and suggestions concerning designs and the adaptability of chains for meeting your needs. Write for catalog.

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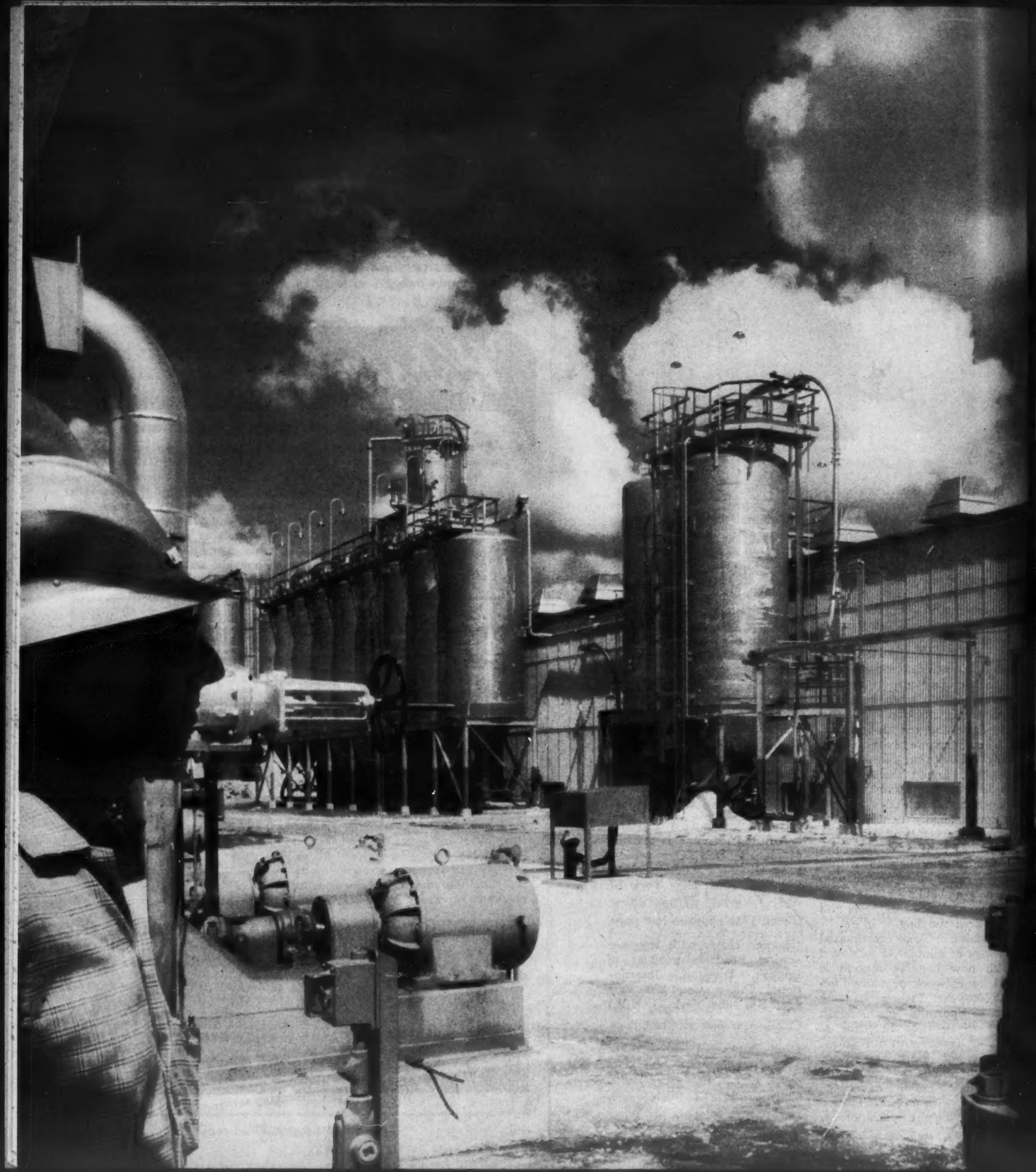

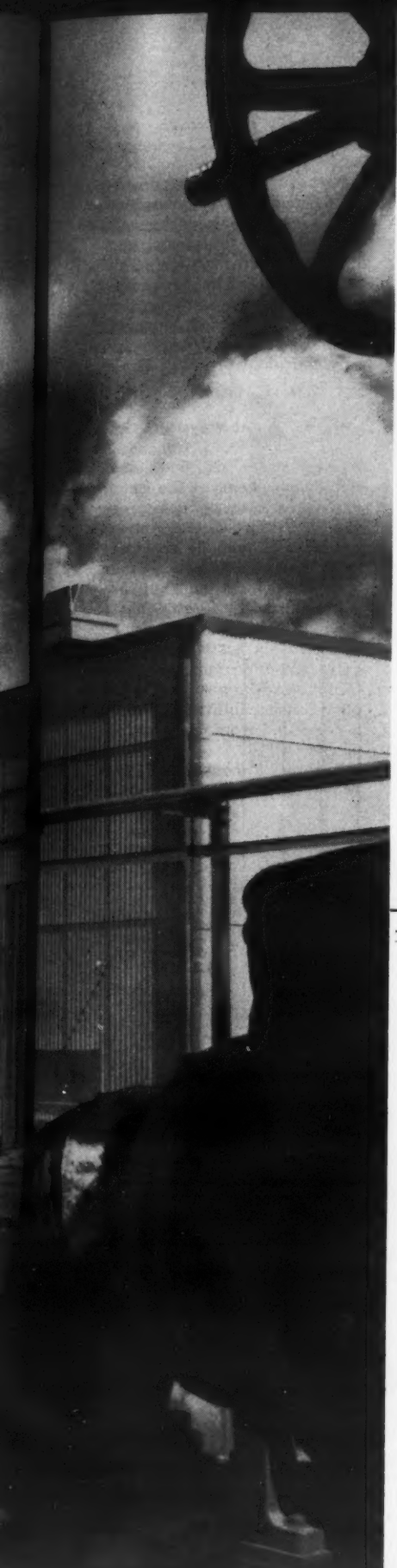

Part of controlled-atmosphere polyethylene handling network at Grace. Conveyor System 2 deposits polyethylene crumb in either of two storage bins in center. Bins at left are filled by Systems 3, 4 and 5

☆ A CP FEATURE
MATERIAL HANDLING
PACKAGING
and shipping

VIA TELEX

Controlled-atmosphere Conveying Finds Growing CPI Market

Extra expense worth it where purity and safety are paramount . . . as at W. R. Grace polyethylene plant in Baton Rouge

Today about ten percent of all pneumatic conveying systems are of the controlled-atmosphere type, and the ratio is growing as new, more "exotic" materials demand special care to assure purity and safety. Such closed-circuit routing is becoming imperative for protecting sensitive dry bulk products from moisture, oxygen and airborne contaminants, controlling temperature during handling, and preventing explosion or combustion hazards (see box).

Depending on the particular need, the conveying media used are: carbon dioxide; nitrogen; dried, filtered and temperature-controlled air; helium; general inert gases.

Points of Difference

A controlled-atmosphere conveying system incorporates a higher degree of "automation" than an ordinary air conveyor. More instruments are needed to record vacuum or pressure and temperature. An oxygen analyzer may be needed to give continuous readings and actuate corrective control devices.

System leakage is a main engineering problem. Not only must atmospheric air be kept out, to prevent contamination, but the conveying medium must be kept in, for reasons

CLOSED-CIRCUIT CONVEYING APPLICATION CHECKLIST

✔ Moisture Sensitivity

Many products must be protected from moisture during conveying. Examples are hygroscopic chemicals, sugar, detergent materials, polyethylene for film extrusion, certain catalysts. In these cases, conveying air is kept dry, normally by a silica-gel dryer.

✔ Temperature Sensitivity

Air or gas used as conveying medium may be heated or cooled to establish and hold desired temperature level. Heat exchangers or, in some cases, refrigeration coils are integrated into the system. Synthetic-fiber pellets or powders such as those used in the Acrilan process are examples of materials needing such control. They must be handled with cooled, temperature-controlled air so they won't degrade.

✔ Oxygen Sensitivity

Certain catalysts, finely divided low-pressure polyethylene, and polypropylene and nylon pellets are some examples of products which must be protected from oxygen to eliminate contamination. An inert gas is substituted for air as a conveying medium.

✔ Airborne Contamination

Filtering of conveying air on both suction and pressure sides of blower will prevent atmospheric particles from contaminating the product.

✔ Explosion or Combustion Hazards

Some chemicals may contain traces of unreacted materials that form an explosive mixture with oxygen. Other chemicals either sensitive to oxygen or having the possibility of creating fire or explosion hazard when exposed to it are potassium perchlorate and solid rocket fuel materials. Solution here is an oxygen-free inert-gas system.

✔ Toxicity

Materials emitting toxic gases, such as through sublimation, may be handled safely with inert gas

exclusive direct unloading system cuts CO_2 handling costs

To be sure you get rock bottom CO_2 costs, investigate this exclusive method of handling CO_2 shipments. It's Olin Mathieson's patented Direct Unloading System in which CO_2 flows directly from special insulated tank cars to your process.

This new system bypasses intermediate steps such as storage in refrigerated tanks, handling of cylinders, or converting dry ice, along with the expensive facilities that are required. Maintenance and upkeep are reduced, valuable plant space or land is reclaimed, and a constant supply of CO_2 is available to match every demand.

If your process requires a highly dependable, low cost source of CO_2 supply, talk over your requirements with an Olin Mathieson representative soon. 7333

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Chemicals Division • Baltimore 3, Md.

CHEMICALS

Check 1785 opposite last page.

Closed-Circuit Conveying

From preceding page

of economy. Normally all closed-circuit systems are kept under a slight pressure. Leakage is minimized by using stuffing boxes on all blowers, feeders and other shafts.

Some outward leakage is of course inevitable. Therefore, more instrumentation, and gas-generating equipment, are needed to provide automatically controlled makeup.

Another component unique to the controlled-atmosphere conveying system is the cooler. Normally installed next to the blower, on the pressure side, this controls gas temperature which rises due to friction, compression and general working of the gas as it is recycled over and over again.

Added Costs

Horsepower requirements of closed-circuit systems are comparable to those of straight air-conveying systems, assuming that return lines are properly engineered.

But these gas-return lines, the stuffing boxes, instrumentation, and the gas generators, dryers and heat exchangers naturally add to the expense of a complete system. This extra expense can be profitable where the extra protection is really needed, however, as in the Baton Rouge polyethylene plant of W. R. Grace & Co.

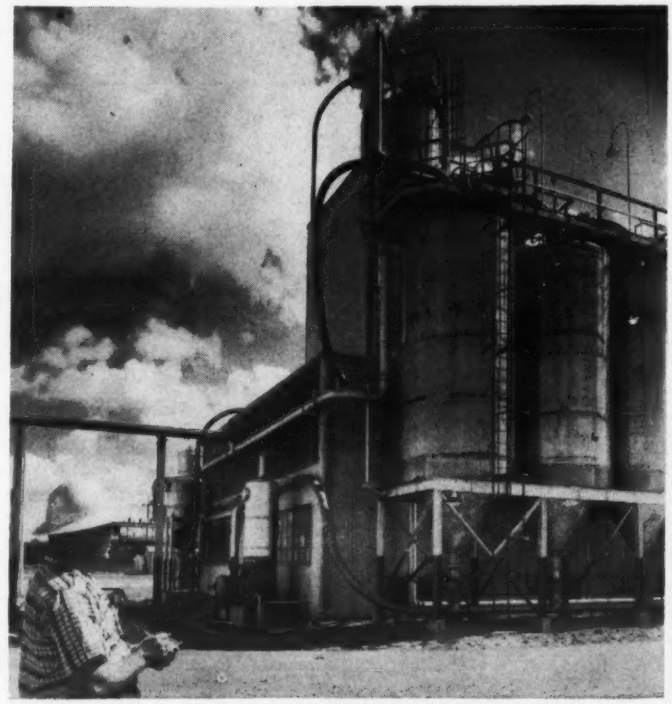
W. R. Grace System

There are six individual conveyor systems at the Baton Rouge plant, all of them pressure type. Two of the systems (Numbers 1 and 2) use inert gas while the other four (Numbers 3 through 6) use silica-gel-dried, filtered air.

All bulk handling performed by these six systems requires only part-time supervision of three men who also have other plant repsonsibilities. All flow is regulated from three control panels.

System 1 consists of two sub-systems which handle

To page 42



Grace's closed-circuit conveyor System 5 moves product from blender to storage bins at right. It also picks up product from bins and carries it to any of three finished-product storage bins

THAT'S INTERESTING

Early bird

Impact of plastics on architecture has extended even to avian world as demonstrated by nest removed from top of crane at Polymer Chemicals division of W. R. Grace & Co. Base of nest was constructed of polymer crumb, a good insulating material.

Aerosol fashions

Within a 10-year span types and shapes available for aerosol containers have increased from two to 75. By 1965 there will be 150 forms of containers to choose from, which will put aerosols among best-dressed packages.

Some heads in the sand

Heads of lettuce and cabbage, cress, radishes and other vegetables are being grown in boxes of sand in the Sahara desert. Nutritive elements are added by French researchists in experiment with soil-less cultivation. Test may lead to gardens in Sahara oil fields.

LEASE...RENT...or BUY

Your Material Handling Equipment

Towmotor Corporation and its subsidiary Gerlinger Carrier Company offer you three simple ways to improve your material handling operations . . . realize immediate savings . . . and accomplish this with little cash outlay.

1. You can put Towmotor-Gerlinger material handling equipment—fork lift trucks and material carriers—to work on a continuous round-the-clock basis through the Lease-A-Truck Plan. No down payment—no working capital tied up—just a small monthly charge.
2. You may also *rent* Towmotor-Gerlinger equipment on a short-term basis—as peak or seasonal demands require. You will start lowering handling costs immediately.
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Complete factory supervised maintenance can be included in any of the above plans.

You'll find Towmotor-Gerlinger handling economies consistently pay the small monthly cost many times over. For complete information on any of these profitable, money saving plans, write or contact Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland, Ohio.

TOWMOTOR-GERLINGER
THE ONE MAN GANG

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

Check 1786 opposite last page.

Conveying

From page 40

catalyst. First phase moves spent catalyst from dump hopper or storage vessels to an activator, or regenerator. Second part moves activated catalyst from storage vessels to process vessels.

This system is used only about 20 hours a month, whenever catalyst must be reactivated. Inert gas prevents deterioration of the catalyst, by oxygen, during conveying and also during storage.

Polyethylene Systems

System 2 picks up polyethylene crumb from dryers and moves it to either of two storage bins or to feed hoppers. It can also move material from storage bins to the feed hoppers. System has a design rate of 3½ tph, is in continual use. Inert gas keeps out oxygen which would deteriorate or contaminate the crumb at this point.

System 3 picks up polyethylene pellets from rotary feeders beneath pelletizing machines and takes them to any of three run bins. Conveying rate is 3½ tph with ⅛"-diam by ⅛"-long pellets. System is in continual use. Dry, filtered air keeps out moisture and contamination, as in the systems below.

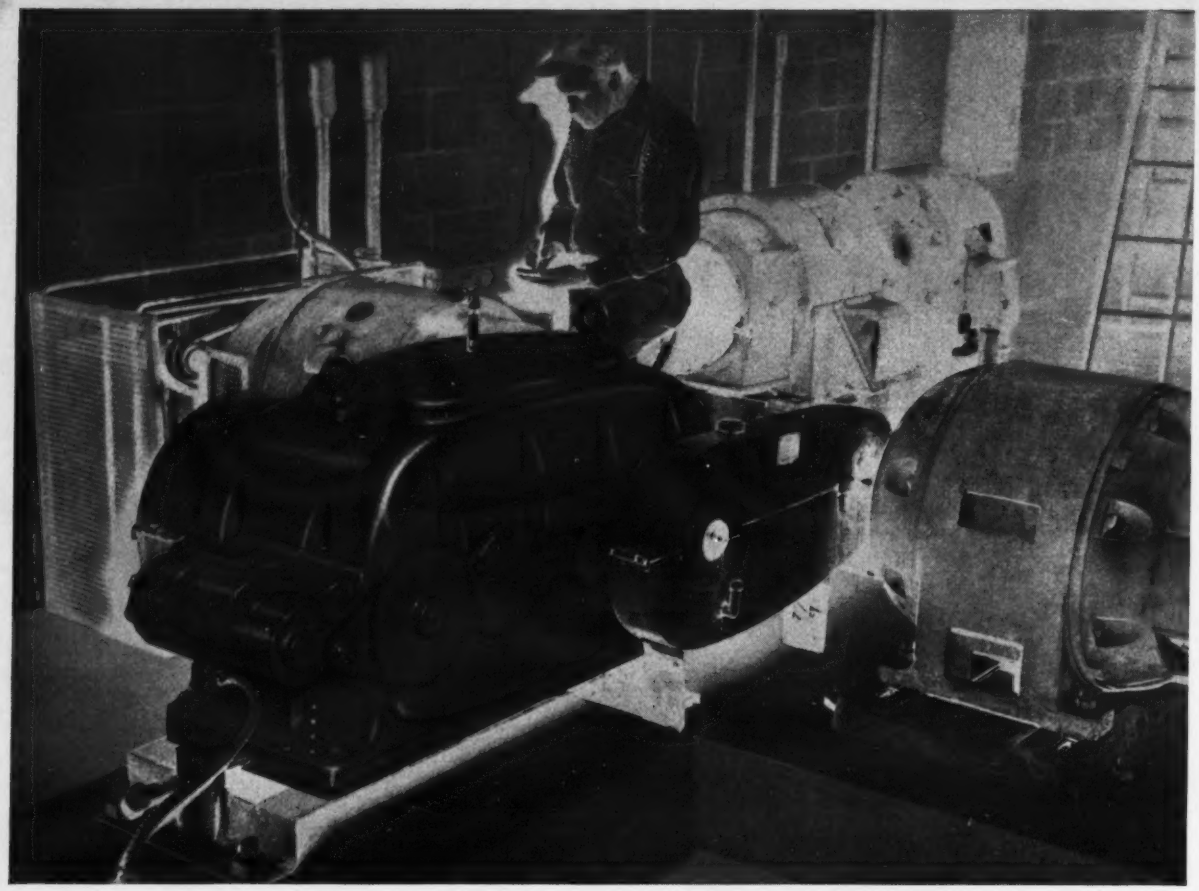
System 4 moves pellets from three run bins or six test bins (filled by System 5) to weigh bin above blender. This has a conveying rate of 15 tph and is in use approximately four hours a day.

System 5 picks up blended pellets and moves them to any of six test bins or any of three finished-product storage bins. It has same conveying rate and degree of use as System 4.

System 6 takes finished product from storage bins to bagging equipment. Conveying rate is 22½ tph; system is used about four hours a day.

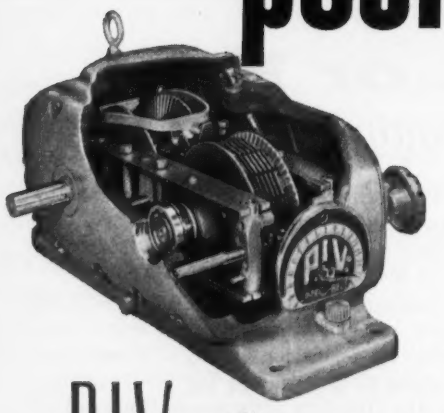
(Controlled-atmosphere conveying systems were engineered by Dracco Division of Fuller Company, Harvard Avenue & East 116th St., Cleveland 5, Ohio.)

Check 1788 opposite last page.



For stepless, slipless, accurate, infinitely variable speed control:

positive P.I.V. VARIABLE SPEED DRIVES



UNIQUE in operation, unmatched in accuracy! That's Link-Belt P.I.V.—the *only* chain-driven variable speed drive. Teeth—not tension—permit instant ratio changes with no loss of efficiency, regardless of load conditions.

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Link-Belt P.I.V. drives are available in 8 sizes and 16 standard types, in capacities from ½ to 25 hp—horizontal or vertical housings. Type RS P.I.V. variable speed drive is available in capacities up to 50 hp.

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P.I.V. LINK-BELT VARIABLE SPEED DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,348

Check 1787 opposite last page.

THAT'S INTERESTING

Burning up energy

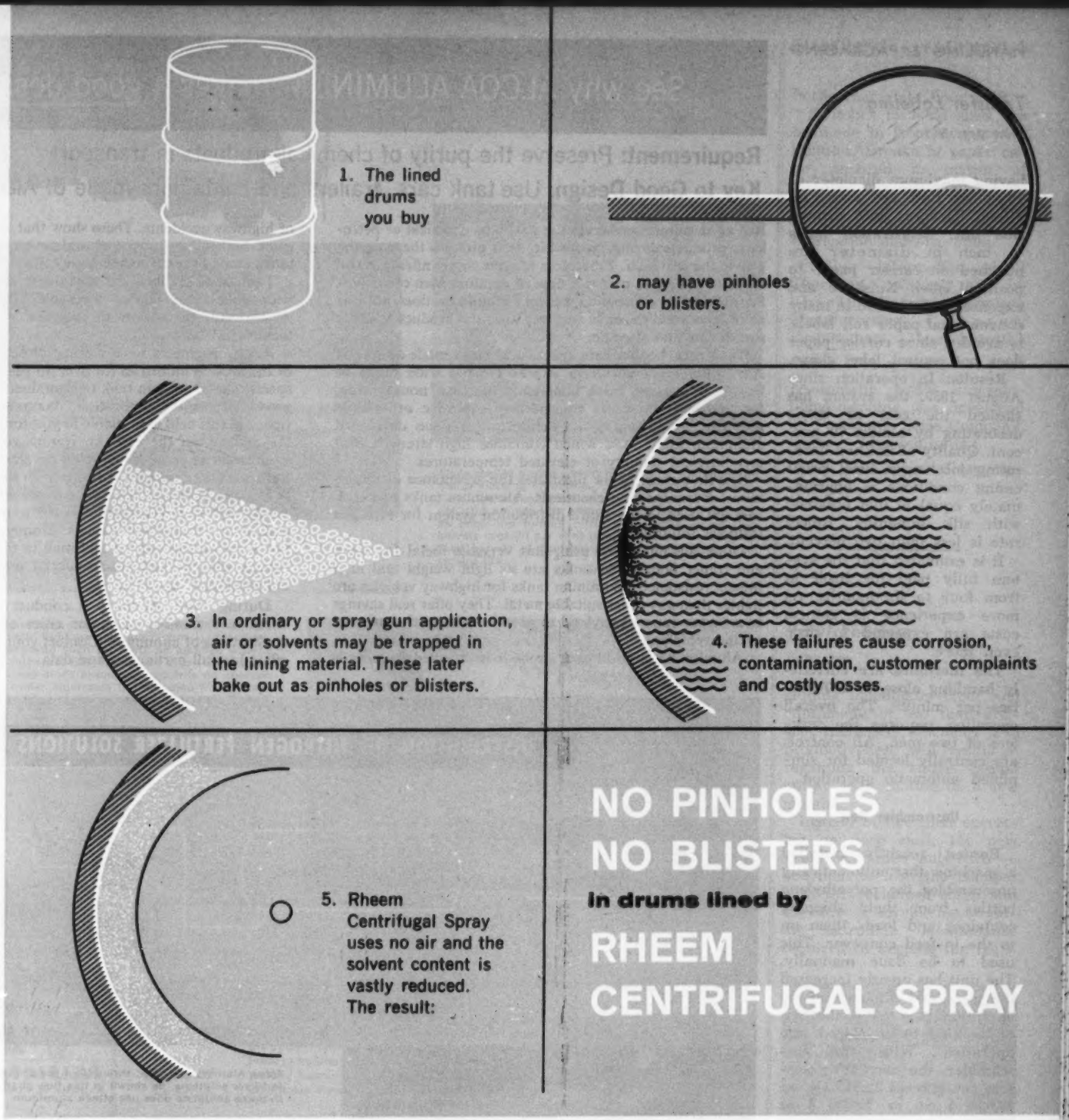
Energy needed to maintain the U.S. living standard is burned up at rate of 41,165 trillion BTUs/yr. Crude oil and natural gas supply 72% of energy needs. By 1975 energy requirements are expected to be 79,884 trillion BTUs/yr.

Plastic not plaster

Plastics in variety of colors and patterns are used for walls, doors, kitchen cabinet doors and counters in Temple, Texas home of Ralph Wilson. Mr. Wilson wanted his home to be graphic example of products made by firm he heads — Ralph Wilson Plastics, Inc.

Telescope has TV eye

Transistorized TV camera attached to 36″ telescope at Case Institute of Technology observatory takes its audience, via three 21″ screens in auditorium, to within 150 miles of moon. Camera weighs about 4 lb and its maximum dimension is 8″.


1. The lined drums you buy
2. may have pinholes or blisters.
3. In ordinary or spray gun application, air or solvents may be trapped in the lining material. These later bake out as pinholes or blisters.
4. These failures cause corrosion, contamination, customer complaints and costly losses.
5. Rheem Centrifugal Spray uses no air and the solvent content is vastly reduced. The result:
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RHEEM
CENTRIFUGAL SPRAY

And that's not all. For more than three years, Rheem Centrifugal Spray has been delivering lined drums free of thin spots and globs or skips. Air turbulence is eliminated. Human error is eliminated. Lining thickness is controlled to within 1/10 of a mil. Linings are cured by unique Rheem Vertical Curing in three stage, high temperature ovens. For more information, or help in developing a lining for a problem product, write the world's largest manufacturer of steel shipping containers at 1701 West Edgar Road, Linden, New Jersey. Plants across the country . . . Chicago, Houston, Linden, New Orleans, Richmond, Calif.; South Gate, Calif.; Tacoma. For other sales offices see the Yellow Pages.

Rheem

Check 1789 opposite last page.

Transfer Labeling

From page 34

having maximum diameter of 10 inches. Rolls are wound on 3-inch ID cores with printed side out. Registration holes ⅛ inch in diameter are punched on carrier paper to position label. Nuisance and expense of slots, used in many conventional paper roll labels, is avoided since carrier paper does not control label shape.

Results: In operation since August 1959, the system has slashed the cost of bottle decorating by almost 70 percent. Quality of finished decorating job under ideal processing conditions is approximately equal to that obtained with silk screening. Reject rate is less than two percent.

It is estimated that the system fully paid for itself in from four to six months. As more experience is gained, costs are expected to drop even more.*

The machines are currently handling close to 100 bottles per minute. The overall operation requires the services of two men. All controls are centrally located for simplified automatic operation.

Unscrambler New

Borden recently installed a machine that automatically unscrambles the polyethylene bottles from their shipping container and loads them on to the in-feed conveyor. This used to be done manually. The unit has greatly increased the speed and efficiency of the operation. It is one of the first of its kind to be placed into operation. With the unscrambler, the decorating system can process 32,000 1¼ oz, 24,000 4 oz, or 19,000 8 oz

*According to information furnished by Dennison, cost of decorating (one-color, two sides) one thousand 1¼ oz bottles by conventional silk screening is approximately 14 to $17. The larger 4 and 8 oz bottles may run 14 to 19 and $21. Using the Therimage process, the same jobs might only cost about 5.50, 7.90, and $11.50 respectively. Savings in practically all installations ranges between 50 to 75%.

Switching to two-color labels on front of bottle would boost decorating costs only by about six cents per thousand 1¼ oz bottles. If silk screening were used, price increase could amount to as much as $8.50 per thousand.

See why ALCOA ALUMINUM makes a good design habit

Requirement: Preserve the purity of chemical products in transport

Key to Good Design: Use tank cars, trailers and containers made of Alcoa Aluminum

Just as aluminum preserves the purity of chemical or petroleum products during processing, so it protects them on the way to the customer. Processors of ammonium nitrate, nitric acid and hydrogen peroxide depend on aluminum containers for moving their products because aluminum does not discolor, contaminate, or in any way alter the product as other metals can, and often do.

Tank cars, hopper cars, trucks and tanks made of ALCOA Aluminum resist corrosive attacks from a wide range of liquids and gases. Such containers are also nonsparking, for increased safety in transporting explosive or volatile products. For shipping hot ladings, ALCOA has developed aluminum alloy 5454 which combines high strength with metallurgical stability at elevated temperatures.

The flow chart below illustrates the acceptance of aluminum for transporting chemicals. Aluminum tanks and tank cars are used in the entire distribution system for nitrogen fertilizer solutions.

Other advantages of using this versatile metal for truck and trailer bodies and tanks are its light weight and high impact resistance. Aluminum tanks for highway vehicles are lighter than any other suitable metal. They offer real savings in a higher ratio of payload to gross weight, with less wear on the vehicles.

Aluminum's high impact strength is reflected in records of highway accidents. These show that aluminum tanks and truck bodies have survived and returned to service where tanks made of other metals have failed.

Tank cars, trailers and containers are easy to fabricate with aluminum. Highly workable alloys available from ALCOA lend themselves to standard welding and brazing techniques.

ALCOA engineers have worked closely with all segments of the process industries for over 40 years, and can help you specify the aluminum tank or container best suited for your product transport application. ALCOA's unparalleled experience in this field is available to you for the asking. Write to the address on the coupon, stating your requirements as specifically as possible. ALCOA's development engineers will welcome the opportunity to work with you on your problems.

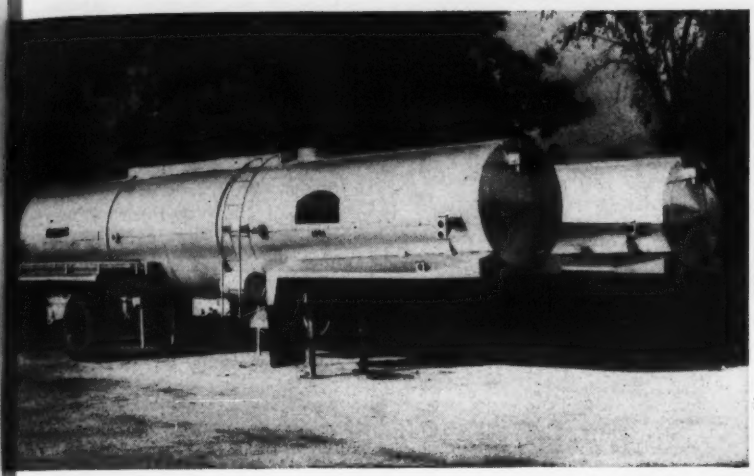
You can also take advantage of the wide selection of free ALCOA literature on aluminum for transportation products and other process applications. Simply check the booklets you want on the coupon and mail to the address indicated. ALCOA will forward your material promptly and without obligation.

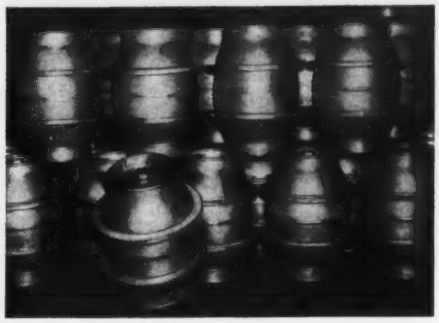
During 1960, ALCOA will conduct engineering conferences in a number of major cities on process industries applications of aluminum. Contact your nearest ALCOA sales office for full particulars and data.

Alcoa Aluminum is used throughout the entire distribution of nitrogen fertilizer solutions, as shown in this flow chart. The ammonium nitrate in these solutions does not attack aluminum.

Barges fitted with aluminum tanks permit a greater payload at a given draft. Transport of acetic anhydride is shown here.

Aluminum hopper cars are widely used to transport sulfur and sulfur-bearing coal, and other solid products used in the processing industries.

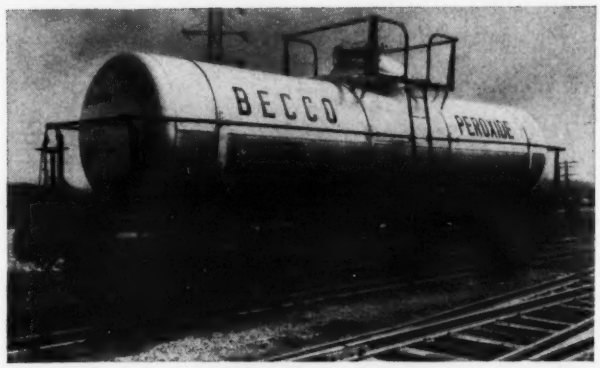


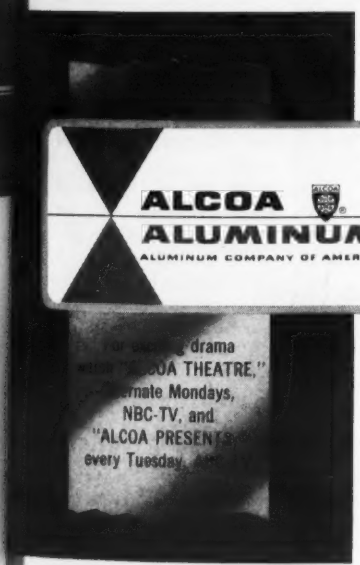


Alcoa makes a wide variety of shipping containers for the processing industries. Conforming to ICC regulations, these containers range in size from 7½ to 110 gal, and are used for shipping such diverse products as beer and fuming nitric acid. Alcoa alclad beer barrels cost 30 per cent less, are 45 per cent lighter than barrels of competing metals, and give longer service life.

Aluminum truck, trailer and tank bodies offer substantial savings in payload because of their light weight. Aluminum is specified because it will not contaminate such products as distilled water, hydrogen peroxide, formaldehyde, fatty acids and other chemicals. Maintenance costs are lower since aluminum requires no special protective coatings. The trailer illustrated is fabricated from Alcoa Aluminum Alloy 5454, and is used for handling hot asphalt, sulfur and other hot ladings.

Alcoa research has developed special aluminum-magnesium alloys combining high strength with the compatibility of high-purity aluminum for peroxide service.





Aluminum Company of America
872-E Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for product transport and other uses in the process industries:

- ☐ GL143 Alcoa Aluminum-Magnesium Alloys Suitable for Structural Welding Applications
- ☐ DD508 Aluminum Alloys in Tank Trucks and Tank Trailers
- ☐ GL86C Unfired Pressure Vessels of Aluminum Alloys
- ☐ 10460 Process Industries Applications of Alcoa Aluminum
- ☐ GL149 Welded Aluminum Gas Cylinders, ICC Approved
- ☐ 20083 Chemicals, Foods and Aluminum

Name_____

Company_____

Title_____

Address_____

City_____

State_____

Check 1790 opposite last page.

bottles per eight hour shift.

Switches in label sizes can be made in from two to five minutes. Breaks in paper can be repaired in matter of minutes too. Maintenance on overall system is negligible, consisting mainly of routine lubrication and inspection.

(Further information about Therimage process may be obtained from Dennison Manufacturing Company, Framingham, Massachusetts.)

Check 1791 opposite last page.

(Automatic bottle unscrambling machine was developed by Pneumatic Scale Company, Quincy, Massachusetts.)

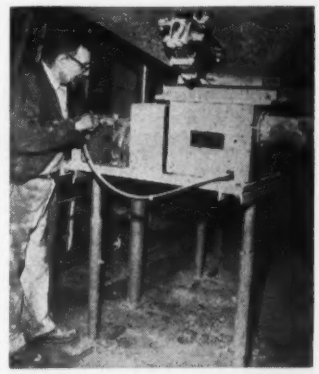
Check 1792 opposite last page.

Vinyl Feeders

From page 35

cluding installation labor and equipment, of less than $10,000. Increased efficiency and productiveness will result in regaining the entire capital outlay in a matter of a few months.

Instead of five men operating on each shift, the new system requires only two — one man to load the chopper with the reclaimed scrap and the other to service the straining extruders. Maintenance required in keeping the feed-



Foreman sets transmission on feeder for proper rate. Once adjusted, the unit operates automatically and at the required accuracy for a given material

PNEUMATIC UNLOADING AND CONVEYING BY ALLEN-SHERMAN-HOFF

Fast, efficient unloading of materials and their transportation to storage was engineered into this pneumatic conveying system by Allen-Sherman-Hoff. Although designed for a new plant, this system can easily and economically be adapted to existing facilities.

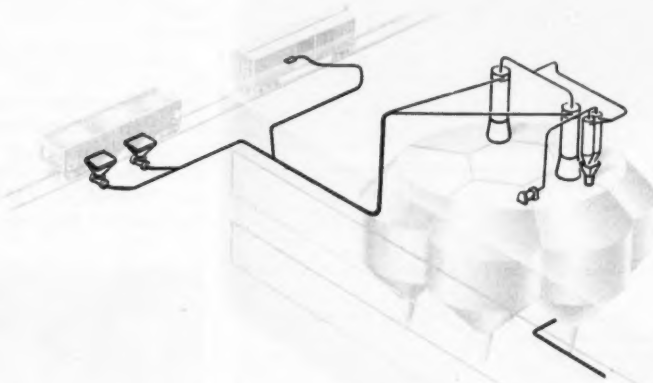
Three unloading stations are provided for. Two accommodate rail cars, a third, not shown, unloads tractor-trailers. The high degree of automation built into this system reduces labor requirements to one man at the switchboard and, when unloading at Station 2, a man operating a pick-up tool.

Allen-Sherman-Hoff Pneumatic Materials Handling Systems are in operation throughout the world—we pioneered in this field. You'll find our installations in plants *where reliability of performance is of paramount importance.*

The system illustrated is a page from our *new* Pneumatic Materials Handling Bulletin, PM-1. If you are interested in more efficient materials handling you should have a copy. We'll be happy to send you one, along with the name of your local A-S-H Representative—he's a materials handling expert you should get to know. Write, wire or phone . . .

THE ALLEN-SHERMAN-HOFF COMPANY, 257 East Lancaster Avenue, Wynnewood, Pa.

Our new Bulletin PM-1 points the way to Pneumatic Materials Handling for your plant and your materials. It's free for the asking.



Check 1793 opposite last page.

ers operating continuously through the 24-hour shifts, five days per week, is practically non-existent. Units are lubricated about every three months.

Total result of the installation is an increased process capacity of 100% and a concurrent reduction in costs of 60%.

An interesting sidelight concerns the difficulties encountered by Supplex, when the installation was first placed in operation, in creating free flow of the vinyl scrap from the bins to the feeders. This was solved with the addition of bin activator devices. Plastic material flows freely and consistently now.

(Feeders and bin activators are products of Vibra Screw Feeders, Inc., 156 Huron Ave., Clifton, N.J.)

Check 1794 opposite last page.

(For further information on variable-speed drive used on feeders, check 1795 opposite last page.)

Owens-Illinois to enter polyethylene bag field

Heavy-duty polyethylene-based shipping sack for industrial and agricultural products is expected to make possible the use of flexible packaging in many cases now limited to rigid types of containers.

Savings in package and transportation costs and lower storage space requirements are some of the advantages envisioned through use of plastic bags.

Bags will be of extruded blown film type and can be printed with multi-color designs.

Present plans call for producing bags for handling bulk products ranging from 50 to 100 lb. Sidewalls will be in 5 to 8 mils range.

Production facilities are now being set up, with full production slated for late 1960.

(Heavy-duty plastic sacks will be manufactured by the Multiwall Bag Division, Owens-Illinois, Toledo 1, Ohio.)

Check 1796 opposite last page.

THAT'S INTERESTING

No grades, no tests

Grades and exams are outlawed in Chemistry X, new type of course being offered by Stevens Institute of Technology, Hoboken, N.J. Students are encouraged to think creatively about chemistry by engaging in moderated discussions of such topics as fuel cells, biological effects of nuclear fallout, chemistry of heredity, and effects of certain drugs on cancer.

High cost of bidding

Just hunting for work can be an expensive undertaking, particularly if you are in the business of designing and erecting chemical plants. The Fluor Corporation, Ltd., estimates that it spends half-million dollars annually in preparing bids. Fluor has been getting 33% of jobs on which it has bid.

For more information on product at right, specify 1797 see information request blank opposite last page.

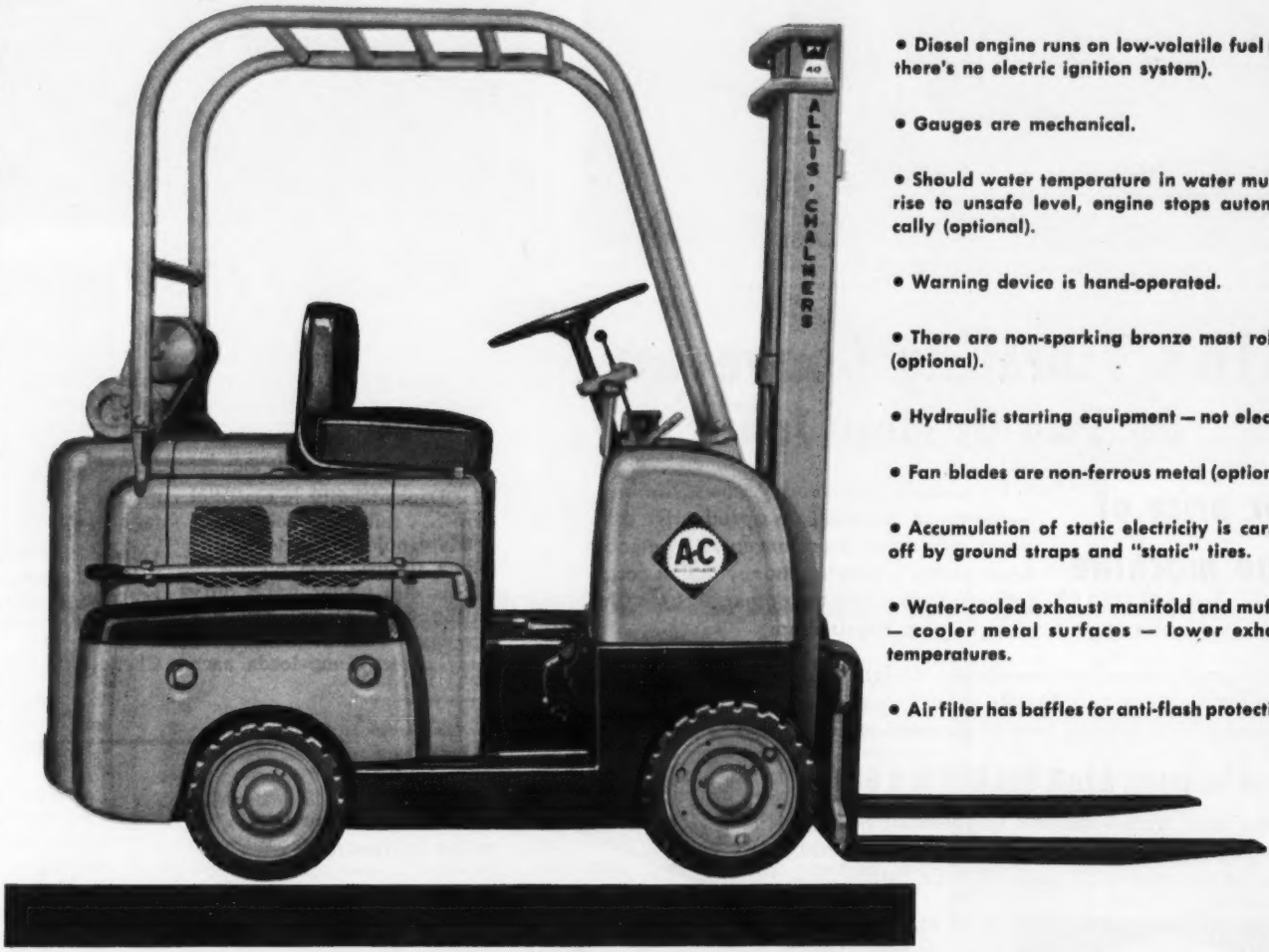
EXPLOSIVE ATMOSPHERE

FLAMMABLE

DANGEROUS FUMES

Is this the SAFETY you need ...in any of your plant areas?

Allis-Chalmers DX safety diesel lift trucks go BEYOND Underwriter's Laboratories DS standards in safety — they were developed to provide exceptional protection where there is possibility of explosion — where a single spark could touch off a disastrous fire. Approved by Mill Mutual Fire Prevention Bureau, they are used effectively in a number of plants where explosive conditions exist.



- **Diesel engine runs on low-volatile fuel (and there's no electric ignition system).**
- **Gauges are mechanical.**
- **Should water temperature in water muffler rise to unsafe level, engine stops automatically (optional).**
- **Warning device is hand-operated.**
- **There are non-sparking bronze mast rollers (optional).**
- **Hydraulic starting equipment — not electric.**
- **Fan blades are non-ferrous metal (optional).**
- **Accumulation of static electricity is carried off by ground straps and "static" tires.**
- **Water-cooled exhaust manifold and muffler — cooler metal surfaces — lower exhaust temperatures.**
- **Air filter has baffles for anti-flash protection.**

Whether you need fire safety or unmatched material handling efficiency, you'll find an Allis-Chalmers lift truck your wisest choice. See your dealer for complete information. Send for Bulletin BU-638 on DX safety diesel lift trucks — 3000- to 8000-lb cap. Allis-Chalmers, Milwaukee 1, Wis.

BH-137

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

POWER FOR A GROWING WORLD

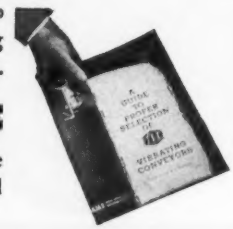
Photographs shows an Ajax Lo-Veyor installed out of the way below the floor. Floor grids similar to those shown in foreground removed to show arrangement of combination conveyor pan and screen.

AJAX Vibrating Conveyors
Do Two Or More Jobs

for price of one machine

With today's skyrocketing costs, the importance of reducing non-productive expense was never more urgent. Large and small plants are saving money in first cost, processing cost, and maintenance cost with Ajax Lo-Veyors engineered to fit your requirements.

Photograph shows an installation designed to simplify and speed up handling and separating bulk materials flowing from 10 production lines.



Send for latest AJAX SELECTION GUIDE

Learn how Ajax Vibration Engineering Service can help you cut your costs. Phone, write, or send coupon for your copy of this helpful book.

AJAX

AJAX FLEXIBLE COUPLING CO. INC.
24 Portage Road, Westfield, N.Y.

In Canada—The Alexander Fleck, Ltd., Ottawa

Please send Ajax Lo-Veyor Selection Guide to

Name_____

Concern_____

Address_____

Check 1798 opposite last page.

☆ A CP FEATURE

MATERIAL HANDLING
PACKAGING
and shipping

VIA TRUCK

Keeping H_2SO_4 Coming

. . . that's the job of this tractor-shovel that shuttles sulfur from storage pile to melting pits at the Newark, N. J., plant of Dixon Research & Chemical. Dependability is essential here . . . failure to deliver the goods would shut down the whole sulfuric acid plant.

This one loader is on duty during a three-shift, 24-hr-per-day schedule, moving forty or so dump-loads each shift from pile to pit—adding up to several tons every day. Closed-in cab protects driver from dust and weather.

Other duties assigned to this machine include spotting of tankcars, handling of refuse.

(Model HU Payloader shown here is a product of The Frank G. Hough Co., Libertyville, Illinois.)

Check 1799 opposite last page.

Blended fertilizers to be compacted?

Compacting of blended fertilizer salts to upgrade and/or densify fine particle sizes is being investigated. The process is already being used successfully by a number of basic fertilizer manufacturers. Its ability to eliminate segregation of fines is highly desirable to blended-fertilizer producers who must assure a completely homogeneous products.

Compacting system agglomerates fines by passing them between smooth rolls capable of exerting pressures great enough to produce a solid ribbon for subsequent granulation in a mill to desired particle size.

(Compacting process is a development of Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin.)

Check 1800 opposite last page.

Fertilizer container switch saves customers, dollars

Stops leaks and corrosion; halves labor costs

Problem: Gasket leakage and container corrosion caused by penetration of urea-base liquid fertilizer through faulty linings were of vital concern to Smith Equipment and Supply Co., Chicago. According to Archer H. Smith, president, "If we had even one percent faulty containers we stood a good chance of losing a customer."

The tubular gasket frequently did not even seal properly in production, and often failed after storage (sometimes as long as a year), presumably because the fertilizer loosened the cement holding the gasket to the

One man fills and seals containers of urea-base liquid fertilizer now that flowed-in gasket is used

cover. The fertilizer, holding chelated iron in certain parts of the year, found the tiniest pinhole in a bad lining and attacked the metal.

Solution: The company turned over its problem to a pail and drum manufacturer in the area, whose technical service group worked with Smith Equipment in solving it.

First a switch was made to a flowed-in gasket—a synthetic-rubber material applied in liquid form to container cover during manufacture. After gasket is cured it is virtually impossible to remove.

Fertilizer samples were then analyzed by the container manufacturer and matched against various possible con-

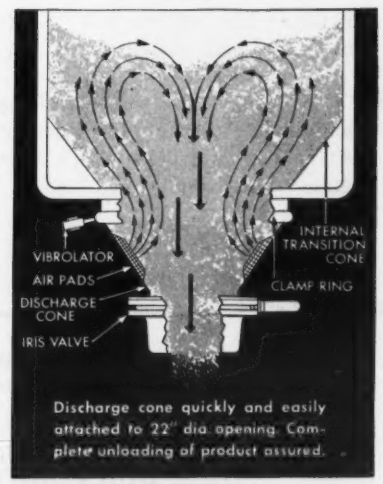
Powell Invert-a-bin® *can be tumbled, vibrated and aerated!*

The most difficult of materials can now be semi-bulk handled. Ideal for in-plant and inter-plant handling. Fine materials such as chalk, clay, cement, whiting, polyvinyl chloride, titanium dioxide, talc, etc., which pack and densify in transit and storage, can now be handled with ease in the Invert-a-bin®.

The ability to rotate or tumble the Invert-a-bin® in the sling type, floor type, or lift-truck grab attachment just prior to discharge restores material to flowable condition. Flowability is further improved by aeration and vibration attachments on the discharge cone—also a partially filled Invert-a-bin® can easily be taken off stream.

Should you be having handling problems with your products, send us a sample for our recommendation. Invert-a-bin® could be your answer to reducing handling costs.

Our Invert-a-bin® sales manager, Lew Lubenow, or our representative in your area is available to assist you in making an engineering and economic survey.



Discharge cone quickly and easily attached to 22" dia. opening. Complete unloading of product assured.

POWELL PRESSED STEEL Since 1920 HUBBARD, OHIO

THE POWELL PRESSED STEEL COMPANY

Lic. under pat. #2862645 **250 ERIE ST. • HUBBARD, OHIO**

Check 1801 opposite last page.

A NEW HIGH...IN VALUE
A NEW LOOK...IN STYLING
A NEW LOW ...IN PRICE

AUTOMATIC'S Gas Operated LIFT TRUCKS

VALUE PLUS—Automatic's simplified power package offers the ultimate in high operating efficiency, low cost of operation, and maximum safety. A gas engine and variable voltage generator, precisely matched, supply exact power to the electric drive motor...no clutch or hydraulic torque converter to cause trouble or worries. Here are a few of Automatic's plus value features:

- Operates on 25 to 30% less fuel
- 50% longer hydraulic pump life
- Oversize brakes last up to 30% longer and are adjustable without removing wheels
- Longer-life, advanced-design roller mounted uprights
- Ventilated exhaust dispels fumes
- New 3-way adjustable seat increases driver efficiency—reduces fatigue

MODERN STYLING—New orange and blue color combination. Automatic's new special high visibility safety orange adds another safety plus feature to your plant, while its new royal blue color accentuates the truck's low center of gravity and high stability.

THE PRICE IS RIGHT—No longer a premium-priced truck, but priced competitively with trucks which use hydraulic torque converters.

CAPACITIES: ▲
3,000 to 10,000 lbs.
with cushion tires.

CAPACITIES: ▶
3,000 to 8,000 lbs.
with pneumatic tires.

AUTOMATIC®
AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale & Towne Manufacturing Company
41 West 87th Street, Dept. E-O, Chicago 20, ILL.

FIRST IN IMAGINATION
FIRST WITH REALITY

LEARN MORE ABOUT AUTOMATIC'S COST-CUTTING LIFT TRUCKS

Please send me complete details about Automatic Gas-Operated, Electric-Driven Lift Trucks, in capacities of_____lbs._____lbs._____lbs.

NAME_____
FIRM_____
ADDRESS_____
CITY & ZONE_____ STATE_____

Check 1802 opposite last page.

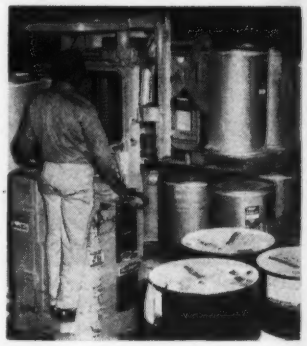
tainer linings. A pigmented thermosetting phenolic was selected.

Also recommended by the container people—and adopted by Smith Equipment—was a plastic spout fitting. This is corrosion-resistant and retracts neatly inside the pail when not in use or during shipment.

Results: Leakage and corrosion have been completely eliminated. Besides this, Smith Equipment has saved 5000 dollars a year, primarily in labor costs. This is because one man can now fill and close the containers. Previously one man filled and another man had to carefully position the tubular gasket and seal the pail.

(Containers recommended and supplied by Vulcan Containers Inc., PO Box 161, Bellwood, Ill.)

Check 1803 opposite last page.



Maximum use of space

...in storing chemicals is realized by using "Reach Fork" truck at Westinghouse transformer plant at Athens, Ga.

Truck operates in aisle only 6' wide, stacking 48 x 48" pallets two- and three-high in storage area. Each pallet contains four drums of chemicals.

(Reach Fork truck is manufactured by The Raymond Corporation, Greene, N. Y.)

Check 1804 opposite last page.

For more information on product at right, specify 1805 . . . see information request blank opposite last page.

Hats off to the can that flips its lid—
CONTINENTAL'S NEW FLIP CAP*

For beauty, economy and convenience, Continental's new Flip Cap* can't be topped. Its dripless pour spout—plus the permanently hinged Flip Cap—makes it perfect for practically all liquids and granulated products now packaged in round or oblong nozzle-type cans.

Snap back Flip Cap and it *stays open*...snap it shut and it *stays shut*. The larger can opening permits higher filling speeds. Flip Cap nozzle inserted after filling assures positive closure. And the top of the container can be fully lithographed—no solder splashes, no flux spots or heat scorching. Flip Cap is available with either ½- or ¾-inch opening, and in a variety of colors. For the full story, ASK THE MAN FROM CONTINENTAL!

*Patents pending

CONTINENTAL CAN COMPANY

Eastern Division: 100 E. 42nd St., New York 17
Central Division: 135 S. La Salle St., Chicago 3
Pacific Division: Russ Building, San Francisco 4
Canadian Division: 790 Bay St., Toronto 1
Cuban Office: Apartado 1709, Havana, Cuba

The Arithmetic of Materials Handling

Fuller Airveyor unloads wood flour to two forty-five foot silos. Second Airveyor system reclaims material 360 feet to processing.

General Electric Changes From Bags to Airveyor . . . Cuts Handling Costs 60%

As part of a program to increase plastics production and reduce operating costs at its Pittsfield, Mass. plant, General Electric Company called in Fuller engineers to design systems for handling wood flour in bulk.

Wood flour—used as a filler in phenolic molding compounds—was being handled in 75 and 100-pound bags. Unloading one carload of bags required 16 manhours. Bags were loaded on dollies and wheeled to a distant elevator.

SAFETY FIRST—The two pneumatic Airveyor® materials handling systems, engineered and manufactured by Fuller Company, were installed by its parent company, General American Transportation Corp., providing undivided responsibility. This installation resulted in a 60% saving in handling costs! The two systems are handled by one full-time and one part-time operator. Manhours to unload one car have been reduced from sixteen to six!

In addition, all equipment is designed to conform to strict safety specifications set down by G-E engineers.

FLOW *YOUR* MATERIALS—The Airveyor is a system that flows your material through sealed pipes. It's fast, safe, and self-contained. The pipes can be placed close to ceilings, run underground or through walls.

Whether you process wood flour—or other dry granular materials—look into the many economies of Airveyor conveying. Write today for interesting, detailed literature on Airveyor and other Fuller pneumatic materials handling systems.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

Fuller
pioneers in harnessing AIR

FULLER COMPANY
136 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Offices in Principal Cities Throughout the World

G-196
1304

"See Chemical Engineering Catalog for details and specifications".

Check 1806 opposite last page.

Gum purity is preserved by easy-clean design of bucket elevator

Side panels unclip to give access to entire inside

Problem: Contamination can't be tolerated in the various water-soluble gum compositions formulated by Harvey Phillips Corporation, New

Gums are dumped into screw-conveyor hopper, moved to bucket elevator (behind operator), and raised to feed top of sifter (far right)

York, N. Y. Even minute amounts of a foreign substance could seriously affect performance as specialized gelling, thickening or emulsifying agents in the food, paper

Elevator's removable side panels give access for quick yet thorough cleaning of all surfaces, preventing cross-contamination between products, bacterial growth and infestation

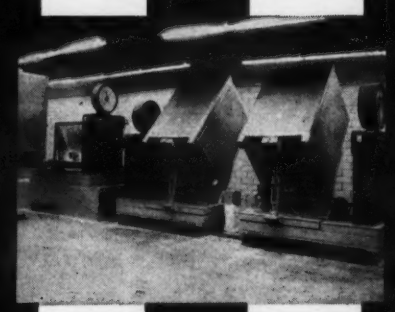
and pharmaceutical industries.

So when for the sake of efficiency it was decided to put in some type of elevating means to raise the various

BULK HANDLING PROBLEMS SOLVED:

the EFFICIENCY of "automation" + the FLEXIBILITY of unit containers =

TOTE* SYSTEM



Compare Tote—a complete, mechanical, automatic bulk handling system based on metal containers plus filling and discharging equipment—with a "push-button" fixed storage bin system. You'll find that Tote offers the advantages you want:

- Compact storage
- Surge capacity between processing and packaging operations
- Accurate and automatic weighing and blending

The labor cost of operating a Tote System is no greater, while the *installation cost of a Tote System is much less.*

IN ADDITION, Tote System retains the flexibility of unit containers:

- *Flexibility in Transportation:* Tote Bins can be shipped by rail or truck, or they can be retained in the plant and filled from bulk hopper cars or trucks.
- *Flexibility in Plant Layout and Procedures:* Tote System can be adapted easily to future requirements. Plant layouts can be changed simply by re-locating discharge stations. Operations can be expanded merely by procuring additional Bins. And the Bins can be used interchangeably for different products.

Why not let our engineers survey your plant at no obligation? Meanwhile, write for new catalog containing complete details.

TOTE SYSTEM, INC.

680 So. 7th, Beatrice, Nebraska

*Tote and Tote System Reg. U.S. Pat. Off.

Check 1807 opposite last page.

Permaglas® Storage Structures eliminate packaging costs

A Texas Corporation maintains contamination-free operation in changing from costly packaging to economical bulk handling.

Towering above the flat Texas Plain at Big Spring—four Permaglas Storage Structures testify to the wisdom of the change from packaged to bulk materials-handling and storage.

Specified by Blaw-Knox engineers, materials-handling consultants for a wide variety of industries such as foodstuffs, chemicals, feed ingredients, rubber, plastics and pharmaceuticals — the Permaglas Structures met all requirements. These steel structures — glass-protected inside and out safeguard products from contamination and discoloration ... and are ideal for storing bulk materials — granular, flaky, pulverized, hygroscopic, contaminable, edible or non-edible.

Delivered and erected quickly at low cost, the Permaglas Structures require little maintenance—no need for painting.

Permaglas system planning service helps you evaluate your materials-handling methods. The Permaglas man in your area will work with you and your staff to give you a complete and factual description, cost summary and recommendation on your present or future materials-handling system. The Permaglas Service includes data on A. O. Smith's exclusive mechanical sweep-arm bottom unloader for *complete* mechanization of your bulk handling and storage operation.

Through research ... a better way

A.O.Smith

CORPORATION

HARVESTORE PRODUCTS

KANKAKEE, ILLINOIS

A. O. Smith International S.A., Milwaukee 1, Wis.

Cosden Petroleum Corporation's three 20' x 50' Permaglas Bulk Storage Structures are loaded by pneumatic conveyor. They discharge ⅛" cube polystyrene molding pellets by gravity into bulk transfer trucks below. A fourth 14' x 15' Permaglas Structure safely stores crumb rubber.

A. O. SMITH CORPORATION
Permaglas Storage Units, Dept. CP-50
Kankakee, Illinois

Send me Permaglas Mechanized Storage Unit Bulletin MU-100.

Name.....

Title.....

Company.....

Address.....

City.....Zone....State.....

Check 1808 opposite last page.

materials to sifter, the question of easy and thorough cleanability between batches became urgent. Not only was cross-contamination to be avoided, but bacterial growth and infestation of these natural gums had to be prevented.

Solution: A stainless-steel-housed bucket elevator with clamp-on side panels that are removed easily when cleaning was installed in mid-1959. Buckets are stainless steel, with rounded corners to eliminate material-trapping crevices, and are attached to neoprene belt.

Material is fed to boot of elevator by variable-speed screw conveyor. All parts of the conveyor are readily reached with vacuum-cleaning tool also used on elevator.

Results: Quality of each formulation is protected by design which permits rapid but complete cleaning between batches. Company is now considering further streamlining of handling by use of a mobile elevator to feed a ribbon blender and feed hopper of bagging machine.

(Elevator was supplied by The Bucket Elevator Company, 57 Union Place, Summit, N. J.)

Check 1809 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

High productivity, safety combined in design of wheel loader

Uses: Bulk loading and handling. Will handle palletized loads when equipped with adjustable-tine fork accessory.

Features: All lift arms and hydraulic cylinders are ahead of operator's compartment ... an important safety feature.

High productive ability from combination of power-shift transmission which permits immediate shifting into

forward or reverse; newly designed high-capacity hydraulic system that delivers full power during critical loading phases; and high stability in all conditions.

Description: Dumping height is 9 feet, 1.87 inches; dumping reach totals 31.75 inches. Bucket has tip-back angle of 41° at ground level, 50° at maximum lift. Automatic bucket positioner and lift kickout, operated hydraulically, are standard.

Powered by 105-net-engine-hp gasoline or diesel engine,

Wheel loader holds load at full lift height of 12 feet while moving to dump into transporting vehicle

wheel loader has two-cubic-yard bucket as standard. Maximum rating of the D330 diesel is 135 hp.

Forward-reverse lever (two speeds in each direction) is on left of steering column. Speed-selector lever is at left forward corner of operator's seat, at hand level. Range-selector lever, to shift between four-wheel-drive work range and two-wheel-drive travel range, is on same lever, at left rear seat corner.

A side-dump bucket is one attachment available. It extends 20 inches to outside of left front wheel, permits dumping to left side with minimum of maneuvering.

Two similar models are scheduled for production this spring. One has standard bucket of 1.25-cubic-yard capacity, maximum bucket lift of 134 inches. The other has 2.75-cubic-yard bucket and 154¼ inch maximum lift.

(No. 944 Traxcavator is a development of Caterpillar Tractor Co., Peoria, Ill.)

Check 1810 opposite last page.

CHECKUP on your Control Valves... CHECKOFF these Annin Advantages*

*Any other source might give you a few... but with Annin you get them all!

MINIMUM number of parts per complete valve.

OVER 60,000 successful case histories of split body valve applications.

POSITIONING ACCURACY guaranteed, .001 inch per inch of stroke.

CONSTANT INSTRUMENT signal sensitivity throughout signal range.

COMPLETE INTERCHANGEABILITY of any Domotor valve to on-off pneumatic control, pneumatic hydraulic, electro hydraulic, electro pneumatic or manual actuator.

ENGINEERED FOR MANUAL control with any of the above automatic actuators, if desired, at minimum cost.

SIMPLIFIED ADDITION of high speed booster units to any pneumatic positioning actuator.

ADAPTABILITY of bellows seal, doolseal or plain extension to any standard valve.

BODY SIZES from ¼" up.

COMPLETE LINE of body ratings: 600—1500—2500 lbs. ASA; special 10,000 and 60,000 psig design, temp. —450°F to 1600°F.

CONVERSION FROM globe body to angle body construction with only one additional part.

ADAPTABILITY TO 3-WAY Valve Construction with minimum parts and cost.

MINIMUM COST for change from soft seat construction to hard seat, or vice versa.

First in a series of checklists on Annin features.

Annin VALVES

THE ANNIN COMPANY
1040 South Vail Avenue
Montebello, California

Check 1811 opposite last page.

PALMER-SHILE

Materials
HANDLING EQUIPMENT
Engineered and Built
to meet your needs

LIFTS OPEN and CLOSED DRUMS

Vertical
DRUM LIFTER

Item C-1258
$54.75

Save valuable plant space with this improved Vertical Drum Lifter. Handled either by crane or hoist, and used where ceilings are high or low. Sure-hold safety-grip is one of its important features. All steel welded construction.

PICKS UP BARREL, BOX OR CONTAINER

BARREL and BOX GRAB

Item NS-288
(2000 lb. capacity)
$87.55

From 40" diameter to small nail keg. Available in 1000 and 2000 lb. capacity. Toggle principle design. Rugged construction of welded steel chain with tongs of heavy bar stock. Weight app. 35 lbs.

Item NS-288-L
$76.45

BARRELS WEIGHING UP TO 1000 LBS. HANDLED WITH EASE BY A

BARREL TRUCK
loads automatically

Loads from a row as easily as when barrel stands alone. Only 24" wide, permitting passage thru doors or down aisles too narrow for many trucks. All welded steel construction. Weight app. 85 lbs.

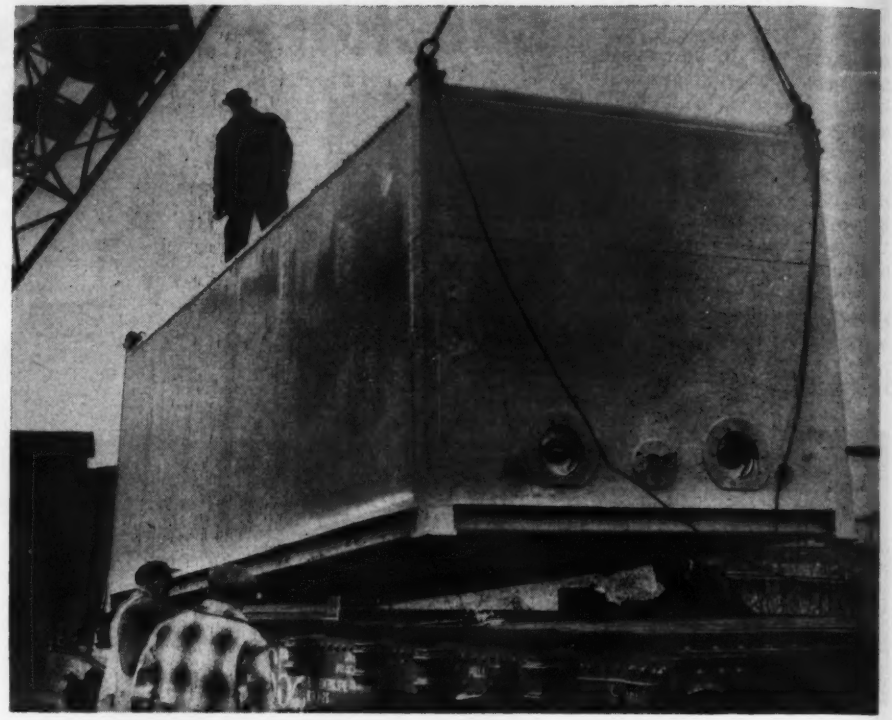
Item S-911-M $54.15
(metal wheels)
Item S-911-R $60.25
(rubber wheels)
Item S-911-P $71.75
(pneumatic rubber wheels)

All prices f.o.b. Detroit, Mich.

DESIGNED AND MANUFACTURED BY
Palmer-Shile Co.
16016 FULLERTON AVE., DETROIT 27, MICH.

Offices in Principal Cities
EXPORT DIVISION: 75 WEST STREET, NEW YORK 6, N. Y.

Check 1812 opposite last page.

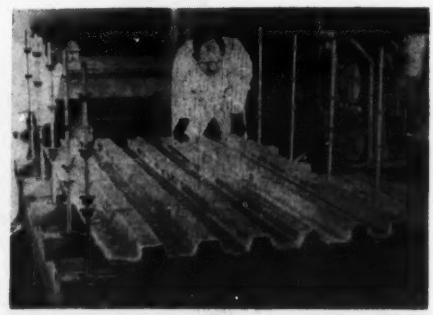


Epoxy/glass fiber cargo carrier being loaded on flatcar by crane. Discharge outlets are in foreground; carrier can be tipped to 60° angle to unload bulk contents

Big stride in containerization . . .

Epoxy/glass Bulk Carrier

Twenty-ton-capacity prototype shows high rigidity, extreme resistance to chemicals and abrasion



Corrugated center section of panel is made up by spraying epoxy on glass-fiber mat fastened to shaped cardboard form. Here the section is being placed into press, with flat outer skin already in place on underside. Similar skin will be applied to top surface and panel put under pressure for final curing

THE future potential of containerized shipping of bulk materials (see page 28, this issue) got a big boost with the recent development of a glass-fiber-reinforced epoxy cargo carrier with a 20-ton capacity. The container's extreme resistance to chemicals, cleaners and salt water make it a good bet for carrying many bulk materials on flatcar, flatbed motor carrier or container vessel. It can be lifted by straddle carrier, large lift truck or crane from one carrier to another.

Resistance to abrasion and fatigue has proved "exceptional" in tests of the first 24x8x8′ carrier. Indications are that the epoxy/glass system can give a structure several times as rigid as conventional aluminum and with "two to three times" the rigidity of similar polyester/glass-structures. On a strength-for-strength

basis, say reports, it should be possible to build a container only three-quarters the weight of aluminum.

Carrier design and method of construction were worked out by Union Carbide Plastics Company, Division of Union Carbide Corporation. In the test prototype, ribbed panels were used, finished off with a flat glass-fiber/epoxy skin on each side of the corrugated section.

Each panel is a 4x8′ section about 2″ thick, and weighs 64 lb. Core for corrugated wall and ceiling sheet is heavy cardboard. Floor panels are built up on an aluminum core and are designed to carry a floor loading of 250 lb/sq ft.

The panels are bonded to a steel frame, including steel corner posts (necessary to give strength for stacking five-high aboard ship). Floor panels are supported by steel cross members at four-feet intervals. In future models, engineers estimate that about half the weight of the steel frame, or about 500 lb, can be saved by eliminating the floor frame and using a monolithic, all-epoxy/glass floor. Additional weight may be saved by epoxy/glass corner posts.

With panels bonded in place, a curved sheet metal molding was bonded to all right angles inside and laminated with epoxy/glass. This provided smooth, rounded corners. Next came installation of manhole covers, intake and dumping spouts, and application of an epoxy "gel" coat, by spray, over entire surface. This forms a smooth, tough surface, and can be pigmented for color.

Union Carbide Plastics Company has awarded a contract for construction of a commercial prototype of this carrier to each of the following two companies. Additional information may be obtained from either one.

(General American Transportation Corporation, 135 S. LaSalle St., Chicago, Ill.)

Check 1813 opposite last page.

(Highway Trailer Company, 250 Park Ave., New York, New York.)

Check 1814 opposite last page.

PAYLOADER® is more productive

more digging and breakout power

Unusual digging power is only one feature of the H-25 that makes it the most productive tractor-shovel in its size range. Following are some of the other features and basic reasons why the H-25 "PAYLOADER" is outstanding in its class:

Full Power-shift Transmission with two speed ranges forward and two speed ranges reverse, plus matched, single-stage, two-phase torque converter.

Power-steering and the smallest turning radius (only 6 ft.) in its class.

Power-transfer Differential giving more reliable traction on slippery conditions by reducing drive-wheel spin-out.

Protected for Long Life by the most complete system of built-in insurance: oil filters; triple air cleaners; sealed hydraulic service brakes and enclosed parking brake; closed pressure-controlled hydraulic systems; oil and grease seals; other protective devices.

Whether your bulk-handling needs require the Model H-25 with 2,500 lbs. operating capacity, or larger tractor-shovels — up to 12,000 lbs. operating capacity — you'll find a "PAYLOADER" is the standard of *any* comparison. Your Hough Distributor is ready to prove it, and has the finest service and parts facilities in the business, backed by Hough factory service personnel.

Two extra-large hydraulic cylinders develop the tremendous bucket breakout, tip-back force of 4,500 lbs. at the cutting edge — more than is available on any other machine in its size range.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
744 Sunnyside Ave., Libertyville, Ill.

☐ Send H-25 "PAYLOADER" data.

Name

Title

Company

Street

City State

5-A-4

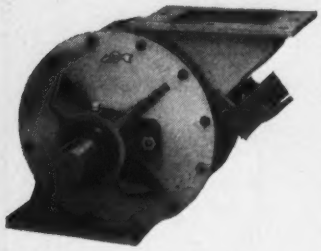
Check 1815 opposite last page.

Rotary airlock feeder needs no adjustable or flexible tips

Uses: Handling free-flowing cubes, pellets, chips, flakes, prills, similar materials.

Features: Reported not to require adjustable or flexible tips, not to crush or grind friables.

Description: Side-entry rotary airlock feeders are made in sizes 2 to 18 in standard type . . . 4 to 14 in blow-through type. Either is furnished with packing-gland seals and outboard anti-friction bearings, in choice of carbon steel, 304 or 316 stainless, Inconel, Monel or nickel.



Feeder is said to be easy on friable materials

(Rotary airlock feeder is made by The Young Machinery Company, Inc., Muncy, Pa.)

Check 1816 opposite last page.

Maintenance costs drop as vibration inducers up alum feed rate

Monthly maintenance charges decreased by over 90%

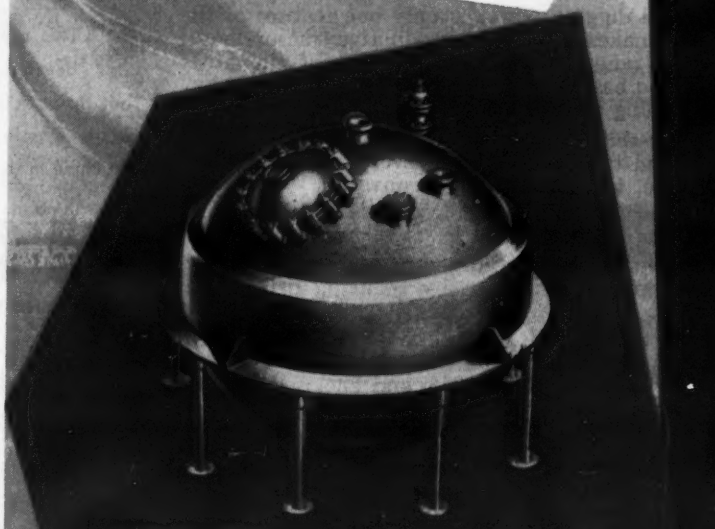
Problem: Maintenance was an expensive proposition on electric vibrators used in American Cyanamid's, Linden, New Jersey, alum department. At times, the bill on these units ran as high as $1200/month. Vibrators were used to maintain flow of Bauxite to precrushers for production of alum [$Al_2(SO_4)_3 \cdot 18H_2O$].

Raw material is brought to top of alum production building on four belt elevators. These discharge into 12″

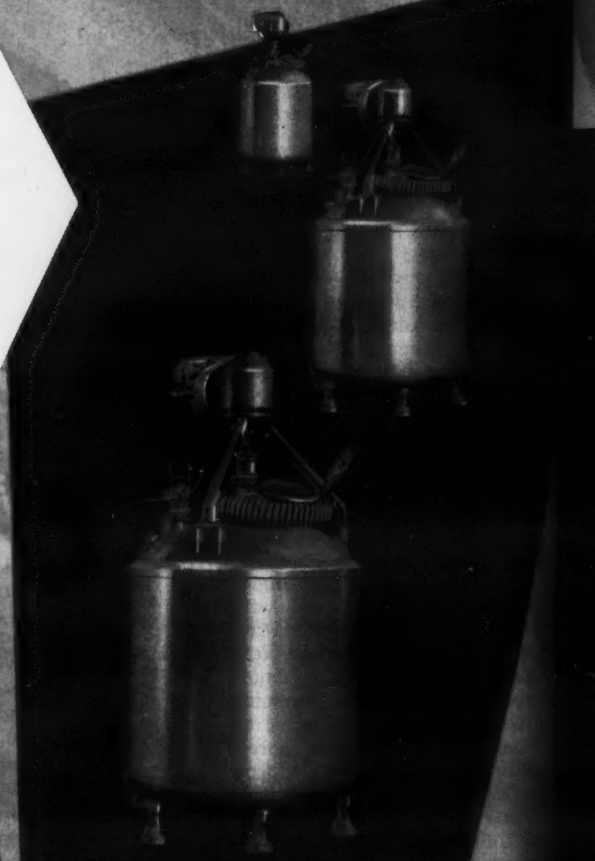
what in blue blazes

Glascote is fanning a creative flame into bigger and better

PIÉCE DE RÉSISTANCE! Just a few months old, 778 is the most corrosion-resistant glass ever applied to chemical processing equipment. More acid-resistant at up to 75° F higher operating temperatures. It's more corrosion and thermal shock resistant than chemical laboratory glass. All this without sacrificing any other protective property.



PROGRESSIVE REACTORS. As new as outer space travel. Glascote's spherical reactor bridges the pressure barrier. It makes possible internal operating pressures up to 330 psi ... jacket pressures to 250 psi. From Glascote—tomorrow's design today.



WE'VE RAISED THE ROOF to give you bigger vessels. Glascote has installed heavier cranes in its new plant addition, and raised the roof on its biggest furnace to accommodate reactors to 4000 gallons, at pressures to 100 pounds internal and 50 pounds in the jacket. These expanded facilities will also allow a more complete line of equipment to meet growing industry needs.

chutes (one for each elevator) which carry material to precrusher hopper. Because this raw feed contains a number of large lumps, combined with the dust, plugging could be a serious problem without the vibrators.

Maximum material flow using electric units was one ton per hour per chute.

Solution: Beginning in early 1958, as electric units failed, they were replaced by pneumatically-driven vibration inducers. In these units there is only one moving part, a steel ball which is driven around a stationary hardened and finish-ground race. Steel ball, spinning around and around

Vibration inducers installed on 12" chute (left) and hopper of precrusher give dependable efficient service 16 hr/day

at high speeds, generates powerful, all-directional vibrations.

With model used at American Cyanamid (DV-51) range of vibrations can be varied from 2000 to 4600 per minute. As an example of air consumption, unit will require 19 cu ft of air per minute if operating at 80 psi, 4300 vibrations per minute.

Results: Vibration inducers have increased product flow by 50%. Most important factor, however, is a drastic reduction in maintenance costs. These costs have been reduced to 1/10th of former figure, usually running about $100/month. This cost is primarily for periodic cleaning (about every three weeks). Units operate on two shifts about 16 hr/day.

(Model DV-51 vibration inducer is the product of Martin Engineering Company, Neponset, Illinois.)

Check 1818 opposite last page.

s are we up to ?

glass-lined equipment for the chemical processing industry

Up to no good for corrosion and contamination — that's for sure! Here at Glascote, glass is fused to steel with a creative flame — a flame that requires the constant spark of new ideas to build stronger defenses against corrosion and contamination. That's why research is another name for Glascote . . . why talent is one of our most important products.

You're probably familiar with some of our "old flames!" In the past, only the best of more than 3000 glass formulas developed by Glascote and its parent organization, A. O. Smith Corporation, gave you superiority in glass-lined reactors, columns, storage tanks, rotary dryer-blenders, pipe and fittings.

But remember, we said that our flame feeds on new ideas. Pictured at the left are some of our latest and brightest contributions. In keeping with this philosophy, others are on the way.

For additional information ask your Glascote representative for specific product data. Or, if you prefer, write direct: Glascote Products, Inc., Cleveland 17, Ohio.

AGITATORS IN ALL SHAPES AND SIZES— Glascote's engineering experience in building agitative systems to customer requirements is at your service. Split-hub agitators for noncorrosive service, loose-blade agitators for inserting large blades through small openings, or special designs to accomplish unusual requirements are part of Glascote's customer engineering.

Through research . . . a better way

A.O.Smith
CORPORATION

GLASCOTE SUBSIDIARY
CLEVELAND 17, OHIO

Sales offices or agents in principal cities. Export Sales: A. O. Smith INTERNATIONAL S.A., Milwaukee 1, Wisconsin, U.S.A.

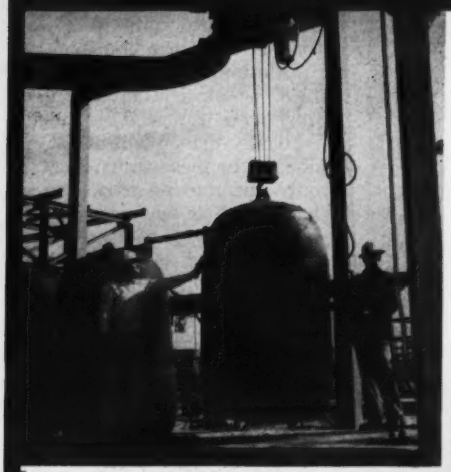
World's largest manufacturer of glass-protected steel products

Check 1817 opposite last page.

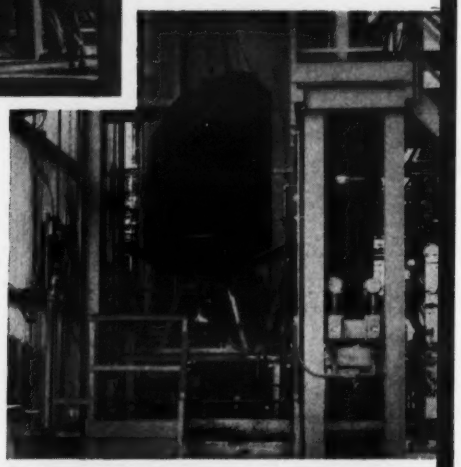
PROBLEM:

HANDLE ALUMINUM CHLORIDE
SAFER, FASTER, AT LOWER COST

or other "problem" materials



Handling aluminum chloride, in U.S. Sealdbins, is a safe, fast one-man job with lift truck or crane. Storing is simple, inexpensive. Sealdbins are their own weatherproof warehouses.



U.S. Sealdbin Containers empty quickly, directly into a process conveyor. No loss of aluminum chloride. No risk of personnel injury.

SOLUTION:

USE PROVEN U.S. SEALDBIN CONTAINERS

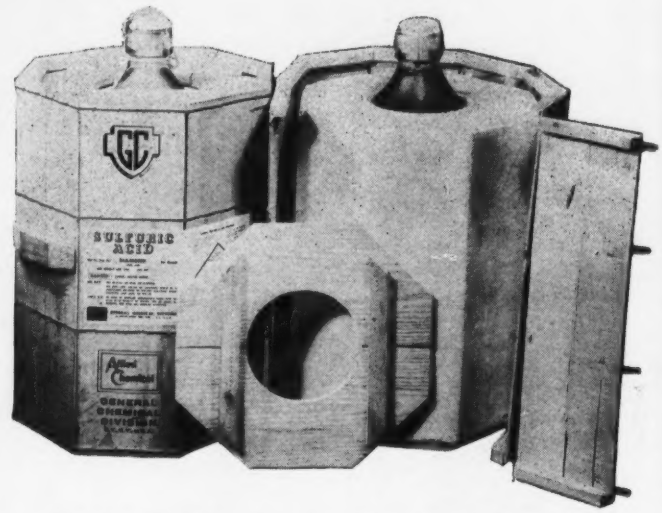
Pictured above are U.S. Sealdbins handling aluminum chloride at the Baton Rouge Refinery of Esso Standard, Division of Humble Oil and Refining Company. Made of high-strength cord fabric and rugged synthetic-rubber compounds, Sealdbins are noncorrosive and moistureproof. They can be collapsed and returned in a fraction of their outbound space. Find out how much time, labor and money U.S. Sealdbin Containers can save for *you*. For latest U.S. Sealdbin facts, write, wire or phone

US RUBBER

TRANSPORTATION PRODUCTS DEPT.
United States Rubber
10 Eagle St., Providence, R. I., DExter 1-4000

Check 1819 opposite last page.

☆ A CP FEATURE
MATERIAL HANDLING PACKAGING and shipping
VIA TRUCK



Inch-thick expandable polystyrene protects glass bottle, is foamed in place

Better protection, lower tare and more compact design make wirebound pack a . . .

Carboy Comer

After extensive testing (at Package Research Laboratory), the above wirebound, expandable-polystyrene-insulated container is now being field-tested by General Chemical Division of Allied Chemical Corporation for their mineral acids. Advantages include reduced breakage, 40% less tare weight, 30% saving in floor storage space, easier handling . . . versus the previous square, nailed rubber-cushioned assembly.

Upkeep 40% Less

General Chem wants to keep actual costs confidential for now, but does report an appreciable reduction in initial manufacturing costs and a 40% reduction in per-trip maintenance costs.

Construction is currently used for the company's 13-gal standard glass carboy bottles; plans are under way to use it for the 6½-gal carboy too. The expandable polystyrene is foamed in place around the bottle inside a mold to give the octagonal exterior shape. Thickness of the cushion runs about 1".

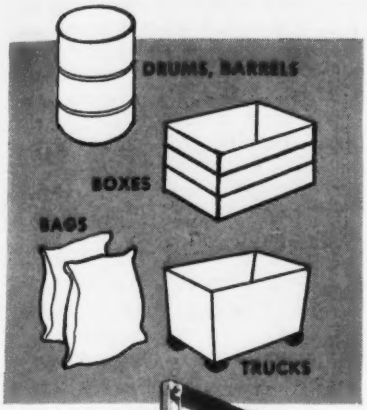
(Acids packaged in wirebound carboys are supplied by General Chemical Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N.Y.)

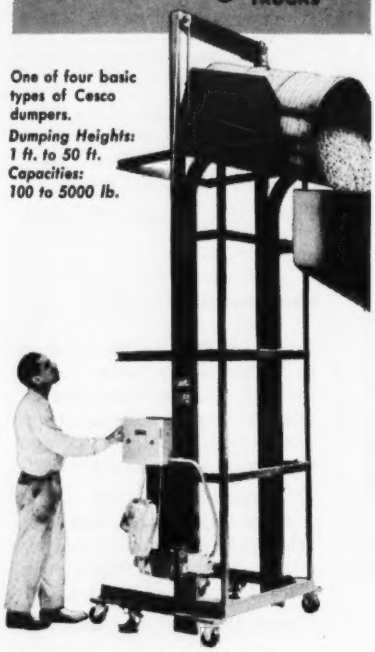
Check 1820 opposite last page.

(Dylite expandable polystyrene cushioning described is produced by Plastics Division, Koppers Company, Inc., 950 Koppers Bldg., Pittsburgh 19, Pennsylvania.)

Check 1821 opposite last page.

the safe, *productive* way to **LIFT & DUMP ANY CONTAINER**





One of four basic types of Cesco dumpers.
Dumping Heights: 1 ft. to 50 ft. Capacities: 100 to 5000 lb.

• Just push a button, and your CESCO dumper lifts and dumps drums, barrels, bags, boxes, trucks — quickly and safely. You save manual labor, reduce hazards, boost productivity. Look around your plant now to see where CESCO dumpers can save for you. Special dumpers engineered to your requirements.

Send for helpful catalog A-7 describing complete line.

CONVEYORS & DUMPERS, INC.
DIVISION OF MERCURY INDUSTRIES, INC.
P. O. BOX 111, HILLSDALE, NEW JERSEY
COLSON EQUIPMENT & SUPPLY CO.
1317 Willow Street, Los Angeles 13, Calif.

Check 1822 opposite last page.

Automatic stencil cutter

. . . operates by means of punched tape prepared by typewriter while order copy is being typed. Reader checks hole combinations one line at time and presents data to translator which signals stencil machine.

Stencils can range from one to four lines and are cut from roll or sheet stock, custom-designed with automatic cut-off.

(Stencilmation unit has been developed by Marsh Stencil Machine Company, Belleville, Illinois.)

Check 1823 opposite last page.

Plastic-treaded wheels cut repair downtime, dock-floor damage

In service year, replacing wheels with 3-month life

Problem: Average life of wheels on material-handling equipment used on shipping docks at Rexall Drug Company's manufacturing plant in St. Louis, Mo., was three months.

Area was covered with diamond-plate dock boards,

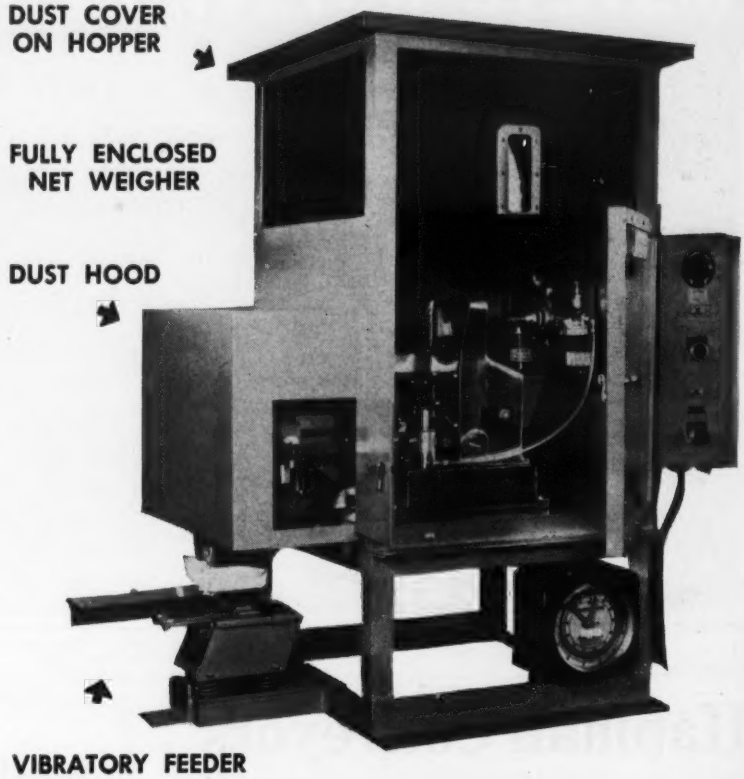
Deteriorated wheels (above) had been in service 3 months, while polyurethane-treaded wheels (below) have been in use for over a year

sharp-edged plates and other wheel-damaging objects which caused wheels on pallet trucks to "chunk out" or be torn away from hub.

Each breakdown involved three to four hours downtime for removing truck from service, unloading and transferring load, removing and replacing defective wheel.

Steel wheels were tried but

Exact Weight® HIGH PRECISION
Timed Feeding



For adding concentrates in precise amounts

This Exact Weight machine feeds dry, free-flowing materials, such as concentrates, with complete flexibility of control. Accurately timed feeding of material over a given period of time guarantees controlled integration of product to the stream. The net weigher, hopper and discharge trough are fully enclosed for protection against dust.

Exact Weight machines of this type are currently being used in food, chemical and pharmaceutical processing operations. Machines are available in capacities from 1 gram to 300 pounds.

Exact Weight weighing equipment is backed by 45 years of experience in building job-engineered scales for all types of applications. We offer experienced advice and factual data on the best method to weigh your product. Request Form 3311.

Exact Weight SCALES

THE EXACT WEIGHT SCALE CO.
905 W. FIFTH AVE., COLUMBUS 8, OHIO
In Canada: 5 Six Points Road, Toronto 18, Ont.

Sales and Service Coast to Coast

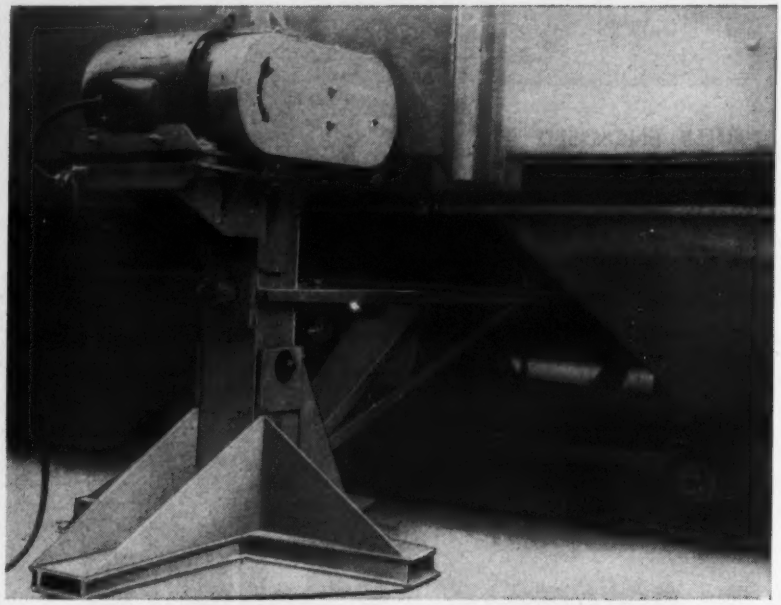
Find us in your local "Yellow Pages"

BETTER QUALITY CONTROL . . . BETTER COST CONTROL

Check 1824 opposite last page.

Shake Covered Hopper Cars

• for greater payload • for faster unloading



Use **NATIONAL 81** covered hopper car shaker to **compact material** during loading operations . . . up to 10% greater payload.

NATIONAL 81 provides fast, **continuous unloading** at the maximum capacity of any unloading system.

Designed for one man operation providing quick, easy, safe, trouble-free operation . . . several models available.

NATIONAL CONVEYOR & SUPPLY COMPANY
357 N. Harding Ave.,
Chicago 24, Illinois

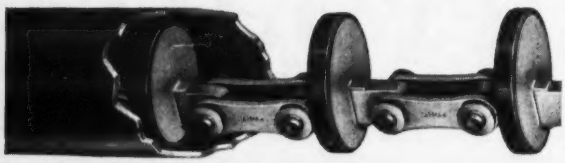
Check 1825 opposite last page.

Hapman Conveyors

offer you these outstanding features for your flowable material:

• Completely flexible • Compact • Self-cleaning
• Self-supporting • Self-feeding • Dust, odor-tight

almost always



cost more

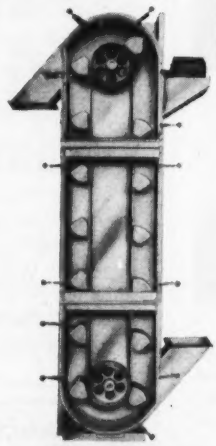
. . . but return their cost many times. Sound engineering, superior materials and workmanship go into every Hapman installation. With Hapman tubular conveyors you have minimum wear, minimum degradation, and maximum trouble-free performance. This is why you may pay more initially, but with Hapman you can be sure of the best conveying system . . . and save in the long run.

For Fact-Finding Report on Hapman Conveyors, write today to:
Dept. CP-5

Conveyor Division
HAPMAN CORPORATION
630 Gibson St. • Kalamazoo 6, Mich.

Check 1826 opposite last page.

buck-el CONVEYOR ELEVATOR



SANITARY

A Centrifugal Discharge Conveyor Elevator that you can clean simply and thoroughly — change from one product to another without contamination.

Casing covers, pulleys, belting completely removable — without disturbing operating machinery.

- Sanitary construction top to bottom
- Featuring small capacities and low headroom
- Stainless or Carbon Steel

see us in C e C page 171

NEW IDEAS for elevating and feeding bulk materials
standard designs adapted to your requirements

write or telephone buck-el CONVEYOR ELEVATOR
The Bucket Elevator Co.
tel: CRestview 3-5350
57 Union Place Summit, N. J.

Check 1827 opposite last page.

these tore floors, necessitating expenditure of $3000 to $4000 annually for floor maintenance and repairs.

Solution: When polyurethane-treaded wheels were introduced, a set was purchased for trial run and installed on truck which received heavy use. After six months use, wheels were still serviceable.

Results: All pallet trucks have been equipped with polyurethane-treaded wheels. Original set is still in use after a year. None has failed to date.

Dock floors, renovated after steel wheels were discontinued, have not required further repair, representing a savings of $3000 to $4000 annually.

Maintenance crew has been freed for other duties.

(Discowheels are manufactured by Disogrin Industries, Inc., 510 S. Fulton Ave., Mount Vernon, N. Y.)

Check 1828 opposite last page.

Narrow-aisle truck

. . . tiers 3000-lb loads up to 180" high but passes easily through 7'-high doors and 6'-wide aisles. The 24-volt truck has a double-telescopic mast that collapses to height of 83".

(MN Aislemaster with Tri-lift mast is a development of Dept. R9-40, Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Mass.)

Check 1829 opposite last page.

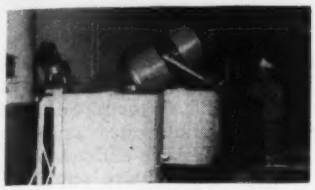
Power-operated drum lift slashes manual effort in dumping paste

About 24 to 30 drums/day are handled with ease

Problem: Dumping 500-lb drums of heavy paste into a mixer by hand required full-time trowelling efforts of three men at William H. Rorer Co. in Philadelphia. A spatially-restricted working area hampered operations considerably. Approximately 24 to 30 drums/day are mixed with other components in one stage of

manufacture of a pharmaceutical products.

Solution: Several pumping methods were tried in vain in attempts to reduce the back-breaking consumption of manpower. In every case paste proved more than a match for best efforts of pumps, such frays ending with clogged



With power-operated drum lift, two men can now easily handle what was formerly backbreaking full-time hand-trowelling operation for three individuals

pumps. Finally, power-operated drum lift was decided upon as method of reducing manpower needs in dumping operation.

Results: Utilization of drum lift has permitted one man to be transferred completely to other duties. In six months of operation, there have been no maintenance problems with unit. It was designed so as to be fully operative in limited-space area of dumping room. In dumping 24 to 30 drum/day, lift is operating at only about 25% of its capacity.

(Power-operated drum lift is product of Sterling Fleischman Company, Box 94, Broomall, Pa.)

Check 1830 opposite last page.

ROBINSON
PNEUMATIC CONVEYOR SYSTEM

80 FIFTH AVENUE, NEW YORK 11, N. Y. *(Division of Morse Boulger, Inc.)*

This Dense-Phase, Fluid Pressure System Has Been Selected by These Leading Firms for Bulk-Conveying of Plastic Resins and Other Dry Pulverized and Fine Granular Products...

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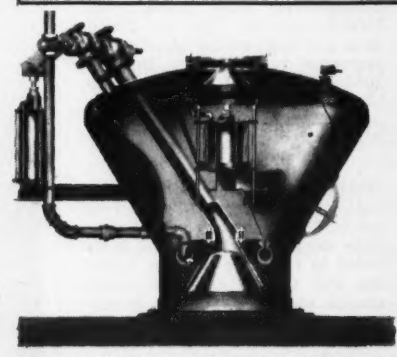
GOODYEAR TIRE & RUBBER COMPANY Polyvinyl Chloride
DOW CHEMICAL COMPANY Polyvinyl Chloride & Potassium Phenylglycine
B. F. GOODRICH CHEMICAL COMPANY Polyvinyl Chloride
ROSS & ROBERTS, INC. Polyvinyl Chloride
ELM COATED FABRICS, INC. Polyvinyl Chloride
HARTE & COMPANY, INC. Polyvinyl Chloride
UNION CARBIDE CHEMICALS COMPANY Plastic Resin
*CELANESE CORPORATION Paraformaldehyde & Sodium Bicarbonate
*GENERAL ELECTRIC CO. (Chemical Div.) Pyroforic reactor wastes
KOPPERS COMPANY Sodium Sulphite and Sulphate
NATIONAL LEAD COMPANY Lead Oxide and Titanium Dioxide
STANDARD OIL (N. J.) REFINERIES Catalysts, filter clays
TIDEWATER OIL COMPANY Fluid Coke
SOCONY-MOBIL COMPANY Catalysts
*HERCULES POWDER COMPANY Explosive Powders
PITTSBURGH COKE & CHEMICAL CO. Pulverized Coal

*These dangerous products are conveyed with nitrogen.

BECAUSE IT IS UNIQUE IN SOLVING A VARIETY OF PROBLEMS, AMONG THEM:

PROBLEM	SOLUTION
Milling or other degrading effects on resins	Entirely eliminated because neither screws nor feeder valves are used.
Need for weighing without a separate weighing operation	Each batch is weighed automatically and accurately (within 1/10th of 1%) with remote batch weight control.
Conveying explosive, pyroforic or noxious substances with safety.	Low air-to-material ratio reduces danger of combustion and explosions, making it feasible to use inert gases economically.
Contamination	System is self-cleaning. In addition, manual or automatic controls, or complete automation are available.
Clogging of conveying lines, expensive repairs and downtime.	Robinson Systems do not block up because materials are conveyed in dense phase by fluid pressure. Materials are conveyed more than 3600 feet, including 300 foot rises. Low maintenance. No auxiliary motors, no bearings to burn out, no screw feeds to replace.
Other material conveying problems	Consult us without obligation.



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Check 1831 opposite last page.

NEW LITERATURE
Material Handling and Packaging

Vibratory feeders are fully described, with data, specifications and illustrations, in 32-page catalog. Also included are data on pneumatically and hydraulically vibrated feeders for explosive materials, dangerous atmospheres or for light, fluffy materials. Vibratory Feeder Catalog — Syntron Co.

Check 1832 opposite last page.

Gravimetric feeder with a capacity of 200 cu ft or more per minute is illustrated and described in two-page bulletin. Unit will totalize the amount fed and will develop an air signal that can operate remote indicators, recorders, controllers. Ref 35.20A-1-Omega Machine Co., Div. of B-I-F Industries, Inc.

Check 1833 opposite last page.

Screw conveyors, screw feeders and components are subject of 76-page book. Literature is divided into seven sections: Introduction and uses of screw conveyors; descriptive data on components, engineering of screw conveyors and screw feeders, specifications of components; inclined screw conveyors and paddle mixers; rotorlifts; and general index. Book 2989 — Link-Belt Co.

Check 1834 opposite last page.

Pneumatic handling of bulk materials is discussed by case histories in illustrated eight-page technical report. Fact File ER-G-6 — Fuller Company.

Check 1835 opposite last page.

Gas-powered fork truck with 2500-lb capacity has its dimensions and engineering specifications presented in four-page Bul SS-2060 — Industrial Truck Division, Clark Equipment Company.

Check 1836 opposite last page.

Mobile loading ramp's part in a completely integrated system of ground-level loading for plant-wide shipping and receiving is detailed in two-page bulletin. Drawing and text reveal how system can be used to advantage in various different situations. Bul MD 212 — Magline Inc.

Check 1837 opposite last page.

Pneumatic conveying and its auxiliary or supplemental values — such as heat transfer, cooling and drying, size reduction and size separation — are discussed in technical-article reprint. Bul I-69 — Sprout, Waldron & Co., Inc.

Check 1838 opposite last page.

Piggyback Growing

From page 32

far in limited use . . . except for the Flexi-Van system.

Containerization and associated transfer equipment are well established in some areas of water transportation, as pointed out immediately below, under "Fishyback & Birdyback."

Despite these and other allied developments, there is still an evident need for a low-cost method of transferring containers which is standardized for *all* carriers.

Efforts to standardize equipment are high on the priority lists of such organizations as the American Standards Association, the USDC Maritime Administration and the National Defense Transportation Association. It appears that agreement is being reached on recommended standard lengths of 10, 20 and 40′ and an 8′ height and width.

Flatcar length appears to be working out to an 85′ figure as far as new units go, which will nicely take two 40′ containers or equivalent in the smaller sizes.

There is a growing fleet of containerships, new or converted cargo vessels adapted specifically for carrying containerized freight with most efficient use of cargo space.

These vessels are part of a system which provides rapid, low-cost, pilferage-free containerized transfer between ship and trailer.

One of these types of ships is pictured in one of the photos with this article; this is a lift-on, lift-off type where the container is placed aboard by crane.

Lines offering fishyback service often have subsidiary truck lines which operate pick-up and delivery service within limited authorized areas. Of course they can also operate in cooperation with separately owned motor or railroad carriers.

There are many who say that containerization will reach its commercial possibilities to the fullest in export-import movements. Experience so far indicates tremendous labor savings at dock-side by elimination of break-bulk piece-by-piece loading and unloading. Standardization will be even more of a problem for this kind of service, however, because foreign requirements must be considered.

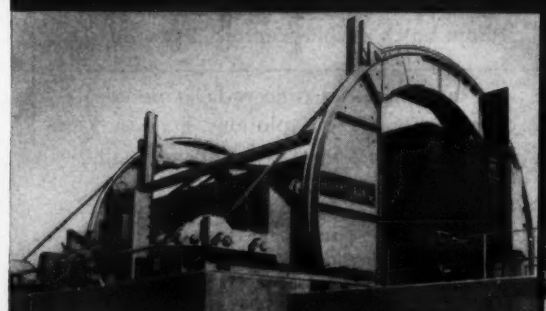
It's far too early to see clearly how containerization will fit into air transport. Obviously the recommended container standards today cannot be handled conveniently by present or projected plane designs. However, the Air Research and Development Command of the United States Air Force is seriously investigating methods which may open up interesting possibilities for eventual complete coordination of a containerized system covering the four major means of transport: rail, highway, water and air.

Bulk Transportation

As indicated above, piggy-backing is making its gains primarily in high-value finished goods. So far it appears that rail rates on bulk movements of liquids and solids are low enough to minimize any large plans to go to containerized shipping of such materials. The trend here seems to be toward king-size tank-cars and specialized hopper cars which can be unloaded efficiently.

But in addition to these, there has been increasing interest in collapsible rubber containers for hauling both liquids and bulk solids, and in metal rectangular bins (such as Tote Bins). While the latter cannot be nested or collapsed to con-

BULK MATERIAL HANDLING



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Check 1839 opposite last page.

serve space when empty, special arrangements can be made to return the empty containers at no cost.

Another advantage of both of these types of bulk containers is that they can serve as customer storage for short periods of time, often eliminating the need for storage bins or silos.

Union Carbide is currently investigating shipping of bulk resins from the Gulf Coast to New York in special containers via coordinated coastal ship/rail movement. Such movement, they figure, would not only save money, but would in many cases also be faster than a straight railroad shipment. Initial volume would amount to 300 million lb/yr, requiring about 1000 containers, with possible eventual volume of 500 million lb/yr.

The Future

Sizing up the strong forces working toward standardization — and the apparent attitude of ICC to look favorably upon operation of piggyback plans that can be proved compensatory — the future looks bright indeed for the containerization principle. Chemical shippers see Plans 3 and 4 as having by far the best potential, although a number see even greater potential in such an arrangement as Plan 5, where the railroads and truckers get together on joint rates.

A major roadblock is the present restriction that only 60% of any one product can move in any one shipment. In the words of Clarence Simpson, Du Pont traffic manager: "The restrictive 60% rule should either be eliminated or reduced. Some carriers require a mixture of as many as five different commodities. This tends to reduce the attractiveness of piggybacking, and changes in such practices appear necessary if Plan 3 is to show real growth and be attractive to shippers as a standard form of transportation available . . . on a daily basis."

Mr. Simpson also offers a word of caution to other industrial traffic managers: "If diversions are made from truck to rail piggyback in wholesale quantities to and from the limited number of major cities where piggyback service is now available — a matter of 'skimming off the cream' of the business — this loss of revenue to the trucking industry could very well make it necessary for truckers to increase their rates to and from points where piggyback service is not available."

Good advice, especially while piggyback service is limited, as it is now. But indications are strong that it is going to grow at an accelerating rate, eventually encompassing a system of coordinated transportation among all carriers.

Plans 3, 4 and 5 for the first time give the shipper a good opportunity — and a strong incentive — to research, develop and perhaps design and build his own container. Who knows what he will come up with? A low-cost disposable container . . . or a cheap disposable plastic liner . . . either of which could solve the problem of return movements? This is not so remote in an industry with such a record of achievement as the chemical industry.

One thing is sure. The man directing traffic movements in a corporation will be even more a key man than he is now . . . and already he is high up the ladder in most organizations which have any amount of shipping. He will have more chance to bargain competitively, among a wider choice of transportation schemes. And he will have to guide and make important decisions in leasing or buying expensive transportation equipment.

In short, there will be much more money riding on every nod or shake of his head.

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REINEVELD CENTRIFUGE- Bulletin 356

Check 1840 opposite last page.

Bulk handling — How a large chemical company paid for a new bulk handling system out of savings within the year is told in four-page reprint of a technical article. Reprint 3-60 — Tote System, Inc.

Check 1841 opposite last page.

Tractor shovel with 6500-lb capacity is fully covered in 16-page catalog. Photographs and drawings depict features of the unit as well as specific applications. Three-color diagram shows how parallel-circuit control valve operates. Model W-10 Terraload'r Cat — Industrial Division, J. I. Case Company.

Check 1842 opposite last page.

Reference table, wallet-sized, converts bag/minute rate of filled multiwall bags to tons/hour. It covers 100-, 80- and 50-lb bags at rates up to 30 bags/min. Conversion table is available from Bag Division, St. Regis Paper Company.

Check 1843 opposite last page.

Tractor shovel with a 2¼-yd capacity, 111 net engine hp and 11'7" dump height is completely described in eight-page bulletin. Many illustrations are used to graphically tell about the unit's engineering, design and construction features. Cat MS-1133 — Construction Machinery Division, Allis-Chalmers Manufacturing Company.

Check 1844 opposite last page.

Non-powered trucks for various specialized purposes are pictured and described in four-page folder. Included are underslung trailer for drums and barrels, ribbed-deck trailer for handling without pallets, stock trailer with chart holder, other trucks for warehouse and plant. "Trucks for Every Plant and Warehouse Need" — Palmer-Shile Company.

Check 1845 opposite last page.

Elevators made like flight conveyors, with concave flights and interlocking flanges, are shown in four-page bulletin. Construction is steel or neoprene. Dimensional drawings show installations with various receiving-hopper arrangements. Bul H-556-A — Conveyor Division, Hapman Corporation.

Check 1846 opposite last page.

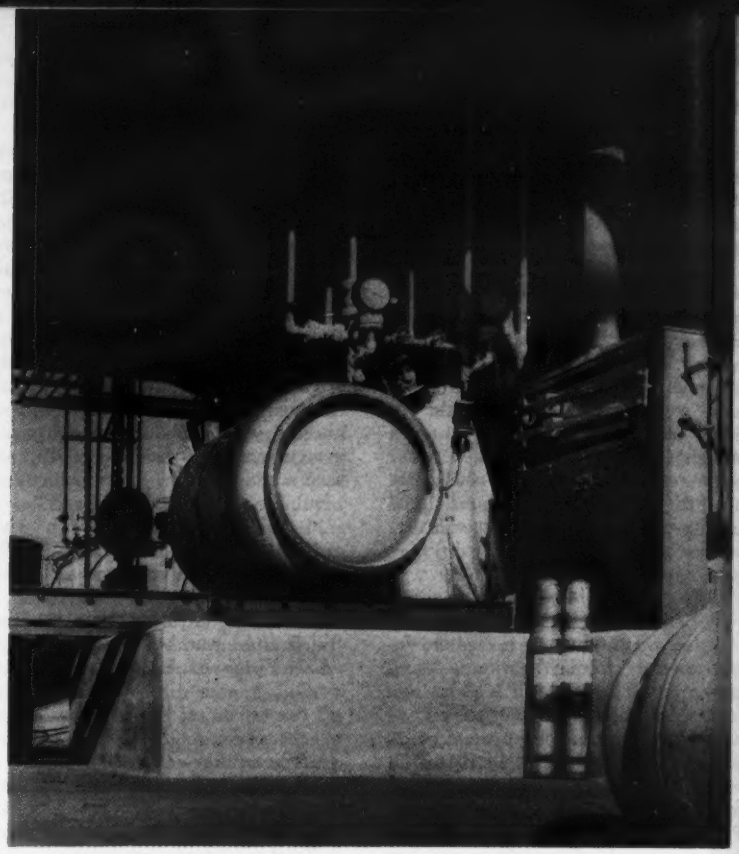
Unitized conveyor's advantages are forcefully pointed out in 22-page bulletin that includes a wealth of installation photos, specifications, schematic diagrams. Literature points out that it is possible to order from pre-engineered standards in stock such items as gravity and power roller conveyors, inclined belt conveyors, drive units and the like, enabling on-the-job installation. Bul 112 — Standard Conveyor Co.

Check 1847 opposite last page.

Only lab curiosities a short time ago, future looks bright for . . .

ORGANO-ALUMINUMS: VERSATILE WORKERS SHOWING VIRTUALLY UNLIMITED POTENTIAL

C. C. BALDWIN, Vice President
Texas Alkyls, Inc., Houston, Texas



Cylinder loading of aluminum trialkyls at Texas Alkyls, Inc., Houston, Texas

Organo-aluminum compounds, until a few years ago, were tediously prepared laboratory curiosities. Today, mostly because of their use as catalysts in low-pressure polymerization processes, these materials are commercial realities.

Almost overnight, market for organo-aluminums as catalyst constituents in manufacture of polyethylene and polypropylene, and as intermediates in production of straight-chain alcohols encouraged Stauffer Chemical Company and Hercules Powder Company to pool resources and know-how to form Texas Alkyls, Inc., country's first large-scale producer of commercial quantities of triethylaluminum and triisobutylaluminum.

With an assured supply of these organo-aluminums available, and the potential for production of many other organo-aluminums and organo-aluminum halides from these facilities, industry is actively exploring other sizeable uses of these reactive and versatile chemicals.

Largest uses for organo-aluminums today are in preparation of catalysts for low-pressure polymerization of ethylene and propylene, and manufacture of straight-chain, primary alcohols. Ziegler and others have succeeded in using these compounds to catalyze polymerization of many other olefinic and unsaturated compounds and any one of the resulting polymers could become a commercial product. A dramatic example is preparation of "synthetic-natural" rubbers from isoprene and butadiene.

Organo-aluminums have further potential in gas-phase aluminum plating of metals and non-metals; production of 99.999% pure aluminum metal and tetraethyllead; tetraethyllead olefin production; electroplating; and synthesis of lubricating oils with special properties.

Three of most widely used organo-aluminums today are trimethylaluminum, triethylaluminum, and triisobutylaluminum. Latter two, which can be produced by the methods of Ziegler, are most important in the field of polymerization.

Organo-aluminum Development

By definition, organo-aluminum compounds are those having a carbon-aluminum bond other than that found in aluminum carbide. Organo-aluminums have been known over a century. They were first synthesized by reacting metallic aluminum with alkyl halides. However neither this method, nor other routes attempted earlier, led to a satisfactory commercial production process.

Key to economical production of organo-aluminums was found in 1938 by an observation that large amounts of ethylaluminum chlorides are formed during the polymerization of ethylene in the presence of aluminum chloride and metallic aluminum. From this first insight, work of Ziegler spanned the gap to develop basic understanding of organo-aluminum synthesis and applications we have today.

Reaction of hydrogen, aluminum, and olefins is route to trialkylaluminums used by Texas Alkyls, under license from Ziegler, to produce triethylaluminum and triisobutylaluminum at its Houston, Texas, plant. Only raw materials needed for process are metallic aluminum, hydrogen, ethylene, and isobutylene.

Chemical Properties

In general, the trialkylaluminums react with all organic compounds except saturated and aromatic hydrocarbons. Chemically, they react very much as do Grignard reagents. Vigorous reactions result when trialkylaluminums come in contact with water, oxygen, alcohols, acids, halogens and halogen compounds, amines and other compounds with active hydrogens, chlorinated aliphatic hydrocarbons, benzyl halides, acyl halides, and many metal halides. Trialkylaluminums are less reac-

To page 66

Allied Chemical Announces 50% Boost in HF Capacity at Nitro, W. Va. Plant
New York, N. Y. (Special)—Allied Chemical's General Chemical Division announced today that it is expanding by 50% the productive capacity of its anhydrous hydrofluoric acid plant at Nitro, W. Va. This is one of several developments which strengthen Allied Chemical's position in fluorine chemicals
OVER 1,000,000 TONS OF ADDED FLUORSPAR RESERVES ACQUIRED BY ALLIED CHEMICAL
New York, N. Y. (Special)—Acquisition of major new reserves of fluorspar, totalling more than a million tons, has been announced by Allied Chemical Corporation. These buttress the Corporation's position in fluorine chemistry and provide additional raw material resources for long range future hydrofluoric acid production

2 More Big Reasons for Making General Chemical *Your HQ for HF*

General Chemical recently announced two developments of interest to every consumer of hydrofluoric acid—a 50% increase in anhydrous HF capacity at Nitro, W. Va., and the acquisition of more than 1,000,000 tons of additional fluorspar reserves. Both announcements underscore General's position as the nation's leading supplier of aqueous and anhydrous hydrofluoric acid.

Here are more good reasons why it pays to make General *your HQ for HF:*

Eight HF supply locations, three producing plants! General Chemical maintains eight HF supply points. Of these, three plants located in North Claymont, Delaware; Baton Rouge, Louisiana; and Nitro, West Virginia, make General Chemical the *only* supplier offering shipment of anhydrous as well as aqueous from more than one producing location.

In addition, General Chemical maintains five aqueous HF bulk storage and packaging stations at Buffalo, N. Y.; Chicago, Ill.; Cleveland, Ohio; El Segundo (Los Angeles), Calif.; and Pittsburgh, Pa. These five points back each other up and further assure service and availability of HF at all times, under all conditions.

Basic position! General Chemical owns and operates its own fluorspar mines and mills . . . and is the country's leading producer of sulfuric acid. This basic position in the essential raw materials for hydrofluoric acid production is your best assurance of dependable supply.

If you'd like more information as to how we can serve you, just drop us a line. Why not do it now?

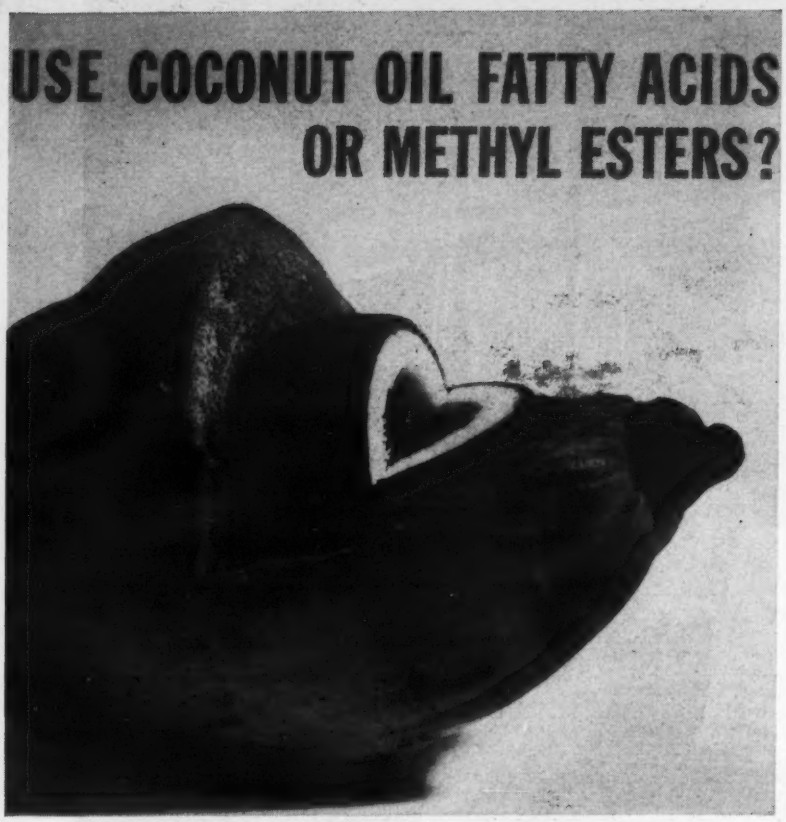
Basic to America's Progress

Allied Chemical

GENERAL CHEMICAL DIVISION

40 Rector Street, New York 6, N. Y.

Check 1848 opposite last page.



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Myristic	*Coconut*	*Laurate*	*Coconate*
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Foremost EL DORADO

FOREMOST FOOD AND CHEMICAL COMPANY

P. O. Box 899, Oakland 4, California

Check 1849 opposite last page.

Organo-Aluminums

From page 64

tive with carbonyls, however, than Grignard reagents.

Despite their pyrophoric nature, organo-aluminums are not explosives and will not detonate or propagate flame backward through the liquid or vapor.

Growth Reaction—Polymerization

This reaction is best known and most important commercial use for trialkylaluminums. Growth reaction of ethylene or propylene in presence of triethylaluminum and titanium compounds is the basis for low-pressure polymerization processes of Ziegler.

Addition of ethylene to triethylaluminum gives a progressive, step-wise growth of alkyl chains by two-carbon increments. While product is always a mixture of alkylaluminums, average chain length can be controlled by regulation of olefin pressure, temperature and reaction time.

Ethylene polymerization via triethylaluminum is thought to be, according to Ziegler:

Operating temperature for this reaction is around 100°C and pressure about 100 atmospheres.

Higher alkylaluminums in preceding reaction decompose readily to form olefins (with chain lengths in multiples of two carbons), continuously regenerating triethylaluminum to continue the polymerization.

Under actual low-pressure polymerization conditions, however, triethylaluminum by itself does not form the carbonium ion needed for the polymerization propagation step. Titanium or vanadium compounds are commonly combined with triethylaluminum to furnish negative ion needed.

Breslow and Newberg report that a diethylaluminum chloride dicyclopentadienyl, titanium dichloride catalyst produces a linear polymer. Triisobutylaluminum, titanium tetrachloride catalysts have been studied for polymerization of hexene-1 and ethylene. Vandadium trichloride has been used with triethylaluminum to produce stereospecific polymers of acetylene.

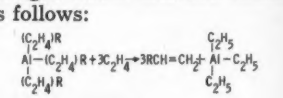
A catalyst composed of titanium trichloride and triisobutylaluminum in octane has been reported for production of isotactic polypropylene and isotactic styrene polymers. Titanium trichloride with triethylaluminum is another catalyst system reported for the isotactic polymerization of styrene.

Titanium tetrachloride-trialkylaluminum catalysts have been studied for the polymerization of ethylene, while the Russians report the use of titanium tetrachloride-triethylaluminum catalysts for stereospecific polymerization of propylene.

Polymerization via this growth reaction is also under development study for butadiene, chloroprene, isoprene, and other olefinic materials.

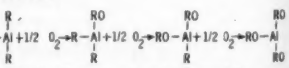
Growth Reaction — New Olefins

Another potential variation of the growth reaction is production of olefins. In presence of catalytic amounts of colloidal nickel, olefins such as ethylene will displace higher olefins to form triethylaluminum. Thus, combined with growth reaction, this displacement can produce a variety of straight-chain terminal olefins as follows:



Controlled Oxidation

Under controlled conditions, small amounts of oxygen will react with trialkylaluminums in a step-wise fashion to form monoalkoxide, then dialkoxide, and finally trialkoxide as follows:



Hydrolysis of trialkoxide, or aluminum alcoholate, yields primary alcohol. This is basis of Continental Oil Company's "Alfol" process.

Continental Oil Company's "Alfol" process for production of straight-chain primary alcohols is another significant

development evolving from work of Ziegler. Based on Ziegler's original findings. Conoco scientists and engineers developed a commercially feasible process for making a whole family of alcohols from aluminum, hydrogen, ethylene, air and a hydrolyzing agent.

In operating this process, metallic aluminum, hydrogen, and ethylene are reacted to form triethylaluminum. In the next step, more ethylene reacts (the growth reaction) to form higher molecular weight trialkylaluminums. This increases the lengths of the alkyl chains by two-carbon increments up through 18 or more carbons.

The growth product then undergoes a controlled oxidation to form the aluminum alkoxides which are in turn hydrolyzed to produce a mixture of straight-chain primary alcohols. The oxidation step was illustrated during the description of controlled oxidation. Hydrolysis step is as follows:

$$RO-\underset{\underset{RO}{|}}{\overset{RO}{|}}{Al}+3H_2O \rightarrow 3ROH+Al(OH)_3$$

Typical example of the type of alcohol produced from "Alfol" process is 1-octanol, previously derived from coconut oil. Conoco plans to produce a whole range of straight-chain primary alcohols, with from six to eighteen carbons, when its commercial-scale plant goes on stream early in 1961.

Complex Salts-Tetraethyllead Process

Complexes formed by the organo-aluminums with alkali metal salts are of growing interest. When triethylaluminum and sodium fluoride are made into a complex, a new method of making tetraethyllead becomes possible.

Triethylaluminum - sodium fluoride complex is a liquid and a good conductor of electricity. The salt is electrolyte used with a lead anode and an aluminum cathode. When current passes through the cell, tetraethyllead forms at anode and pure aluminum at cathode. Triethylaluminum

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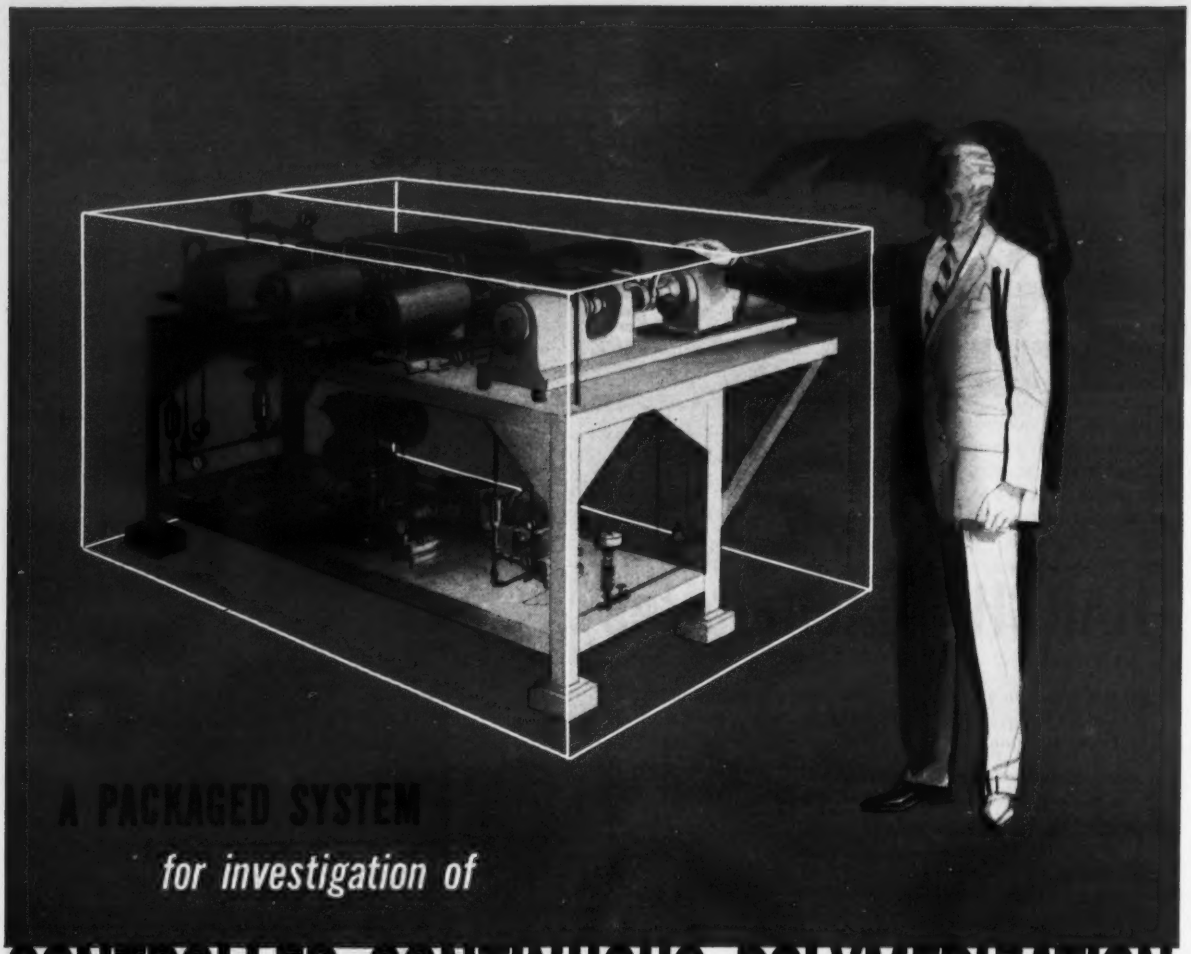

CONTROLLED CONTINUOUS POLYMERIZATION

VOTATOR* processing equipment is used for continuous polymerization reactions in numerous installations. It affords fast, efficient, controlled processing not possible in batch reactors.

Girdler's experienced engineers operate extensive pilot facilities to provide exact specifications for scaling up to production equipment. VOTATOR engineered systems are designed to meet your own specific process requirements. These systems provide a high degree of flexibility and versatility. They save materials, use less floor space and assure significant overall operating economy.

Rugged, dependable VOTATOR continuous reactors are fabricated by skilled craftsmen in strict compliance with ASME codes. Materials of construction are carefully selected according to the properties of products processed.

Packaged VOTATOR pilot systems are now available for studies of continuous reaction processes in your plant. For additional information write Girdler Process Equipment Division, P.O. Box 43, Louisville 1, Kentucky.

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CHEMETRON

VOTATOR CONTINUOUS PROCESSING EQUIPMENT FOR CHEMICAL & FOOD INDUSTRIES • VOTATOR PISTON & GRAVITY FILLERS • VOTATOR PLANTS FOR FATTY OILS INDUSTRY • THERMEX DIELECTRIC HEATING EQUIPMENT

Check 1851 opposite last page.

Organo-Aluminums

From preceding page

is added to replenish bath as the reaction progresses. Ziegler has also announced an improved process for making tetraethyllead which used $NaAl(C_2H_5)_4$ (made from triethylaluminum and ethylsodium) as the electrolyte. Tetraethyllead forms at the anode and sodium at the cathode.

Plating and Missile Fuels

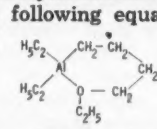
The trialkylaluminums offer a source of pure aluminum, either in bulk or as plate on metal or non-metal surfaces. Thermal decomposition of triisobutylaluminum, for example, can be controlled to form metallic aluminum, olefins, hydrogen, and small amounts of other products, such as Al_4C_3. Based on organo-aluminum chemistry and electrolysis, aluminum plating or production of 99.999% pure aluminum now appears feasible.

Alkylaluminums have high energy contents, making them attractive as pyrophoric fuels in ram-jet powered missiles and as high-altitude, jet-flame sustainers in turbojet engines. Triethylaluminum, for instance, has a total enthalpy at 25°C of 20,160 Btu/lb.

Complexes — With Ethers and Amines

Alkylaluminums, with their Lewis acid characteristics, form complexes readily with organic donor molecules, such as ethers, dialkyl tellurides, dialkyl selenides, thioethers, tertiary phosphines, and tertiary amines. Isoquinoline forms a 1:1 coordination compound with triethylaluminum, diethylaluminum hydride, and similar compounds.

Triethylaluminum reacts with 4-ethoxybutylmagnesium chloride to form 4-ethoxybutyldiethylaluminum shown in the following equation:



Linear polymerization of this cyclic compound has been reported.

Reducing Agents

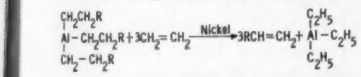
Alkylaluminums, particularly triisobutylaluminum and diisobutylaluminum hydride, are good reducing agents for carbonyl groups. Often they appear to function much like lithium aluminum hydride, but are less expensive. This type of reduction is especially applicable to chloral, benzaldehyde, cinnamaldehyde, and similar compounds. Combined with hydrolysis, this presents another route to alcohol.

Triethylaluminum reduces some ketones to corresponding hydrocarbons, while others are condensed and dehydrated. Triethylaluminum and acetone yield mesityl oxide. Other work reports that triethylaluminum, as a reducing agent, can be used in the synthesis of metal carbonyls.

Olefin Production

Several reactions offer potential processes for olefin production. These include thermal decomposition, reduction reactions and olefin displacement.

Ethylene, in the presence of catalytic amounts of colloidal nickel, will displace the alkyl groups of higher trialkylaluminums to form triethylaluminum, as shown below:



Thus, combination of the olefin displacement reaction with the growth reaction offers a chemical route to a large variety of straight-chain terminal olefins having even numbers of carbon atoms.

Saturated Hydrocarbons

Saturated aliphatic hydrocarbons result from the reaction of alkylaluminums and alkylaluminum halides with compounds containing labile hydrogen, such as organic and inorganic acids, alcohols, and primary and secondary amines.

Another route to saturated hydrocarbons is the reaction of water with alkylaluminums and alkylaluminum halides. This reaction is made possible for alkylaluminums having

BRIEFS

on a low-cost chlorinating agent
purity-protected carbonate of potash
fast-dissolving sodium benzoate

S_2Cl_2 . . . EASY WAY TO GET CHLORINE

Hooker sulfur monochloride is a good chlorinating agent.

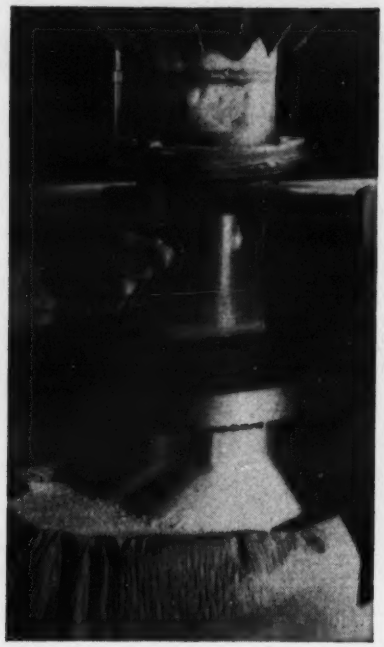
It's relatively easy to handle. You can store it without having gas pressure build up in the container. You can purify it by distillation.

It's a yellow to slightly reddish heavy liquid with a definite set of physical properties. It contains 52.0 to 52.5% chlorine.

You can get some helpful tips on sulfur monochloride, and the many other Hooker chlorides, from our new technical bulletin *Hooker Chlorinating Agents.*

This 24-page bulletin describes typical reactions. It saves you time with a quick comparison of physical properties.

Check the coupon for your copy and for the sulfur monochloride data sheet, too.



K_2CO_3 . . . WITH PACKAGE-PROTECTED PURITY

The extremely high purity of Nialk® carbonate of potash makes it the natural choice of men who make TV tubes, optical glass, and other glass products that must be bright and clear.

We protect that purity with a special package—from the time it leaves our plant and as long as it stays in yours.

Every barrel, fiber drum, and bag that contains our solid carbonate of potash has a moisture-resistant lining.

We ship larger amounts in 50-ton dry-chemical hopper cars, specially designed to preserve purity.

If you'd like description, typical data, and specifications on Nialk carbonate of potash, just check the coupon.

SODIUM BENZOATE . . . A FAST FLAKE IN SOLUTION

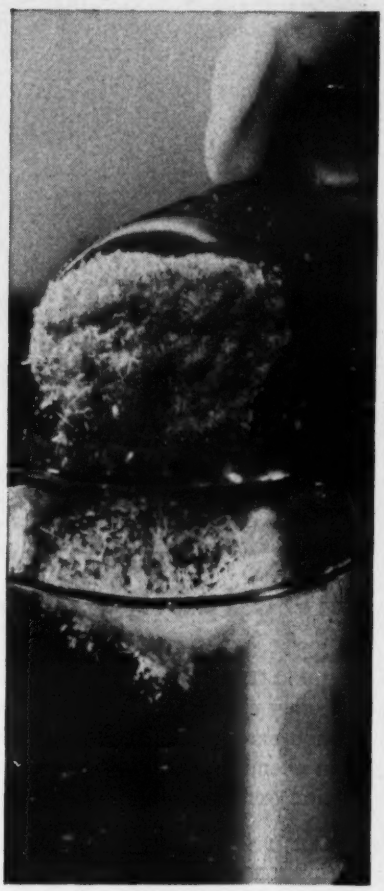
If you'd like a sodium benzoate that dissolves faster than the powdered form, you might consider a switch to Hooker flakes.

As you see here, this flake form starts dissolving as soon as it hits the water.

Thanks to an unusually careful flaking-screening operation, the Hooker flake stands shipping well and won't dust.

It comes in two grades: U.S.P. grade is over 99% pure, contains a max. of 0.2% benzoic acid, 0.5% water. Technical grade is also a high-quality material at 98% purity, with 0.4% benzoic acid max., and the rest water.

You can get either grade in powder form, too. For data sheet, check the coupon.



For more information, check here and mail with your name, title and company address.

☐ Sulfur Monochloride Data Sheet ☐ Technical Bulletin 328-B, *Hooker Chlorinating Agents* ☐ Carbonate of Potash Data Sheet
☐ Sodium Benzoate Data Sheet

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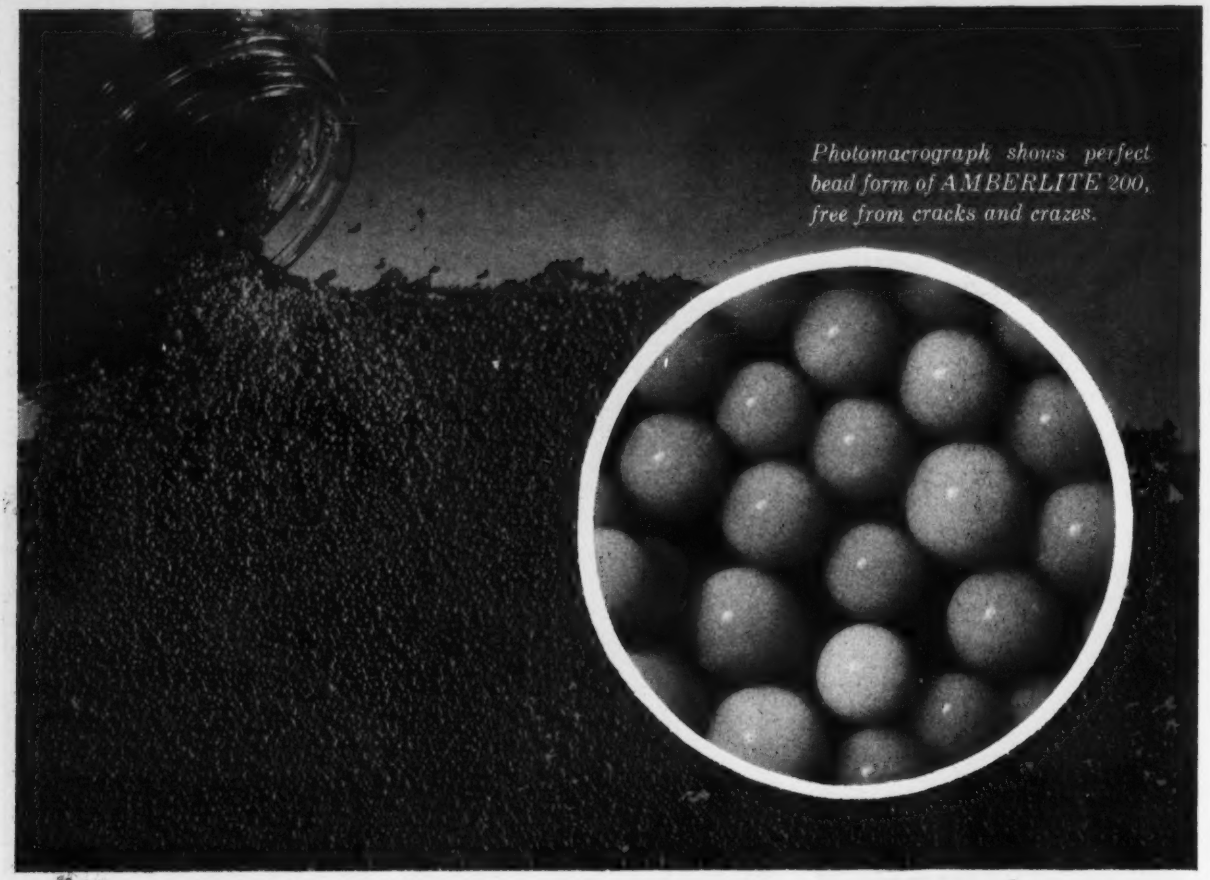
Check 1852 opposite last page.



AMBERLITE 200

Introducing new durability for Ion Exchange Resins

AMBERLITE 200 represents an entirely new concept in polymer chemistry. A high capacity, strongly acidic cation exchange resin, AMBERLITE 200 has physical and chemical stability unmatched by any available cation exchange resin.

These are some of the outstanding features of AMBERLITE 200 . . . *high resistance to oxidation,* especially in water containing chlorine, oxygen and metals such as iron, copper and manganese; *perfect bead form,* free of cracks and crazes; *high attrition resistance; stability over the entire pH range; insolubility in all common solvents.*

In addition to water treatment in either hydrogen or sodium cycle operation AMBERLITE 200 has unusual value in the treatment of highly concentrated solutions such as sucrose and glucose, where resin dehydration causes rapid failure of conventional exchangers. Resistance to oxidation makes AMBERLITE 200 useful in treatment of highly aggressive solutions such as chromic acid or where high operating temperatures are involved.

Write for full information and samples on this radically new AMBERLITE resin.

AMBERLITE *is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.*

Chemicals for Industry

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

Check 1853 opposite last page.

Organo-Aluminums

From preceding page

butyl or smaller alkyl groups by moderating the normally almost explosive reaction with water by dilution with hydrocarbons.

Other Trialkylaluminum Reactions

Alkylaluminums have been used or tested in various processes for producing synthetic lubricating oils with special viscosity properties. When hydrogen sulfide is passed into a solution of triethylaluminum etherate in ethyl ether, the product is ethylaluminum sulfide. Hydrogen telluride decomposes similarly under similar conditions.

Alkylaluminums react violently with carbon tetrachloride, producing a complex mixture of products.

Reaction of trialkylaluminums with carbon dioxide, aldehydes, and ketones yield either addition or reduction products, depending on the conditions, while reaction with sulfur dioxide yields sulfinic esters.

Triethylaluminum also acts as a catalyst in the formation of esters from aldehydes, such as in conversion of acetaldehyde to ethyl acetate.

(Organo-aluminums are products of Texas Alkyls, Inc., Houston, Texas.)

Check 1854 opposite last page.

Sodium dispersion in solid form

Uses: Sodium dispersions can be used in any reaction requiring sodium in metallic form. Typical reactions would include claisens condensation; Wurtz reaction; purification of hydrocarbons and other organic compounds by eliminating water, alcohols, or mercaptans.

Features: Product offers a safe convenient method of handling high-surface sodium dispersion. There is no pouring. Finer particle size results in more active sodium.

Description: Dispersion

consists of 50% sodium with an average particle size of 10 microns, and 50% paraffin or naphthalene binder. It is supplied in 1 lb bricks which can be easily handled in air and cut to any weight or size.

(Solid sodium dispersion is a product of Gray Chemical Inc. PO Box 119, Gloucester, Mass.)

Check 1855 opposite last page.

Micro-fine metallic oxides in development quantities

Four micro-fine metallic oxides are now available in development quantities. Suggested uses include catalyst carriers, polishing agents, organic dye stabilizers, whiting agents, thermal insulators, flow agents, solvent thickeners and reinforcing agents.

In ceramics, oxides develop a micro-crystalline structure to achieve high strength and fine texture. It can be used as reinforcing agent in oxide-strengthened metals, plastics and elastomers.

Four oxides available are of the metals aluminum (Micria AD and AL), titanium (Micria TIS), and zirconium (Micria ZR). Flakes are very fine, each particle about two-and-one-half millionth of an inch thick.

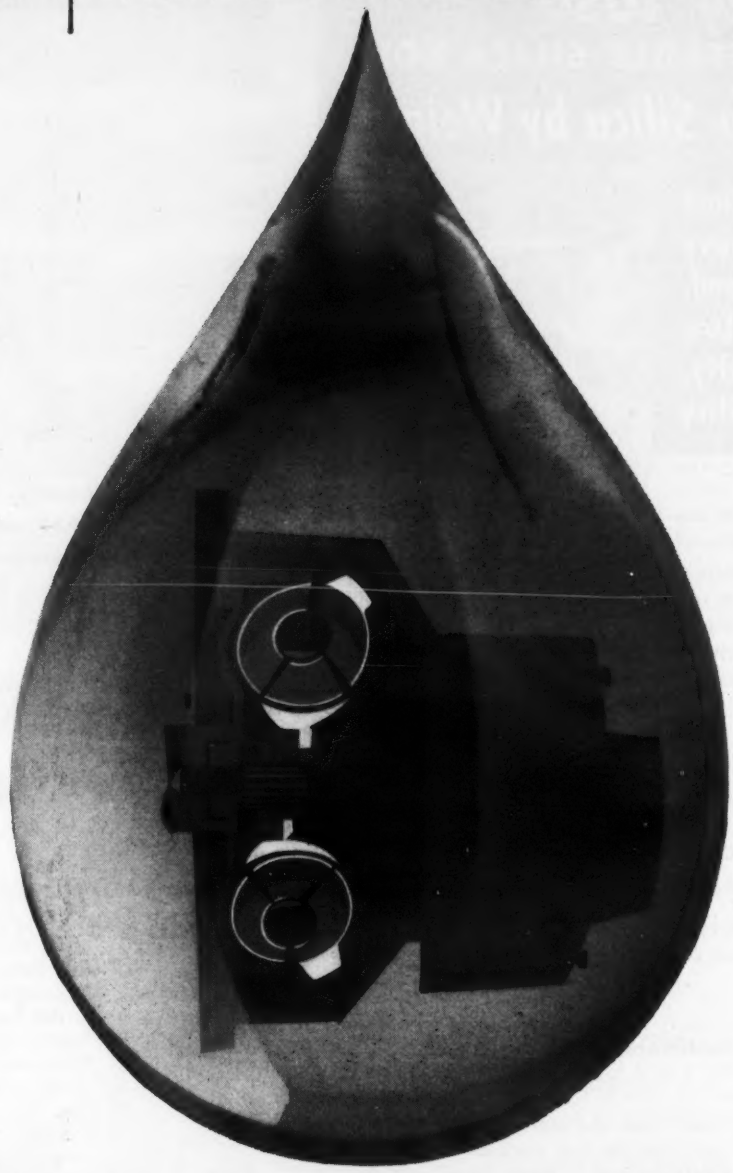
(Micria AD, AL, TIS and ZR micro-fine metal oxides are the product of Research and Engineering Division, Monsanto Chemical Company, 800 North Lindberg Boulevard, St. Louis 66, Mo.)

Check 1856 opposite last page.

NEXT MONTH

Interested in chemicals that made their debut on a developmental scale during the past twelve months? Like to know where they can be used? Next month, CHEMICAL PROCESSING magazine presents the 6th annual Chemical Materials Feature, highlighted by an alphabetical listing of these developmental products, and including CP's exclusive "Use Index."

DOW | BROMINE DEVELOPMENTS



BUILD DENSE FLUIDS WITH BROMINE

Bromine, the only element besides mercury that's a liquid under ordinary conditions, has a density more than three times that of water. Specific gravity is 3.1 at 20/15°C. This property, plus ready ability to unite with other chemical compounds, makes bromine ideal for building high density fluids.

Take hydraulics, for example. Engineers are turning to nonflammable, brominated compounds to develop high density fluids to achieve more compact hydraulic systems.

Close tolerances of moving parts in delicate mechanisms become less important when high density brominated fluids are used. Hydraulic equipment size decreases with an increase in fluid density. You may also increase the power output of your present equipment by replacing the fluid now in use with a high density brominated system.

In other applications, bromine and brominated compounds serve as chemical intermediates in thousands of reactions. Recent fruits of continued research are new brominated compounds especially suited for specialized fire-fighting tasks.

Dow's first product nearly 70 years ago was bromine. Today, besides high-purity elemental bromine, Dow produces over 100 brominated compounds, with new ones constantly under study. And Dow is anxious to explore bromine's potential for helping you improve products and processes. For more information, write THE DOW CHEMICAL COMPANY, Midland, Mich., Chemicals Merchandising Dept. 651LG5.

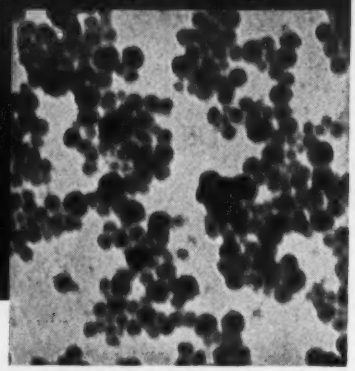
See "The Dow Hour of Great Mysteries" on NBC-TV

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Check 1857 opposite last page.

Nalcoag 1050
STABLE SILICA SOL
49-50% Silica by Weight

New Colloid Carries Heavy Silica Load, Yet has Low Viscosity, Good Stability



Silica spheres in Nalcoag exhibit a high degree of uniformity, have 20-25 millimicron diameters. *Photo taken by electron microscope in Nalco laboratories. 65,000X.*

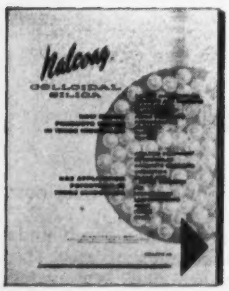
New Nalcoag 1050 is the "compact" model in the Nalco line of colloidal silicas . . . first commercial silica sol to offer you 49-50% silica by weight!

In comparison with the 20% to 35% concentrations now widely used, Nalcoag 1050 gives you up to 60% more silica in every drum . . . effects real savings in storage, handling and transportation costs. And despite its high concentration new 1050 has the high stability and low viscosity so essential to ease in handling and application.

TYPICAL PROPERTIES OF NALCOAG 1050

Percent colloidal silica as SiO_2 49-50	pH . . . . . 9.0±0.1
Average surface area, M^2/gram. . 120-150	Viscosity at 77°F. cps. 20-30
Average particle size, millimicrons 20-25	Specific Gravity at 68°F. 1.385
Density, lbs./gal. at 68°F. 11.6	Na_2O, percent 0.30

BOOKLET SUGGESTS PROFITABLE USES FOR Nalcoag



And these are many! Nalco Bulletin K5 will explain the various ways in which Nalcoag can improve such products as:

Paper Containers	Textiles
Floor Waxes	Foam Rubber
Cements & Mortars	and many others.

Write for your copy today. And if you would like a sample of new Nalcoag 1050, be sure to tell us. We will be glad to send that, too.

NALCO CHEMICAL COMPANY
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. . . Serving Industry through Practical Applied Science

Nalco CHEMICALS

Check 1858 opposite last page.

CHEMICAL MATERIALS

All-Plastic Solid Propellant Rocket

Nose cone—quartz-reinforced phenolic
Payload compartment—glass-fiber honeycomb sandwich
Electronics potting—silicone rubber
Insulation—rigid plastic foam
Erosion shield—refrasil-reinforced modified phenolic
Rocket case—filament-wound epoxy-glass
Liner—asbestos-reinforced phenolic
Propellant—polysulfide perchlorate
Exit nozzle—graphite-reinforced phenyl silane

Another record year was chalked up in 1959, and prospects for 1960 indicate more of the same, as representatives to SPI's 15th annual Reinforced Plastics Div., conference predict a . . .

Rising rocket role for reinforced plastics

REINFORCED plastics are making a strong bid to take their rightful place as full fledged materials of construction, not substitutes. This is the feeling reiterated many times at the 15th annual Technical and Management Conference, Reinforced Plastics Div., The Society of the Plastic Industry, Inc. Some 80 technical papers were presented on new applications, new processes and refinements of existing applications and processes.

A display of over 350 reinforced-plastic products from missile nose cones to fishing rods helped to demonstrate pounds. Estimates for 1960 glass that composes close to 92% of industry's reinforcing materials.

Chemical Industry Use

History of laboratory testing and satisfactory service of actual installations is now becoming significant in showing effectiveness of reinforced plastics in chemical applications. According to a report by James J. Fisher and R. E. Gackenbach of American Cyanamid Company, what was a hope ten years ago is now near reality . . . reinforced plastics are becoming standard materials of construction for the chemical industry. Some typical examples of applications included waste effluent and flume lines, dryer trays, tank linings and protective coatings.

Sales of reinforced plastics rose 42.5% in 1959 over 1958 to a record 264 million pounds. Estimates for 1960 sales range from 10 to 20% over this mark. One of the limiting factors in this growth will be shortage of fibrous glass that composes close to 92% of industry's reinforcing materials.

Polyesters continue to be leading resin for reinforced plastics in most applications. Epoxy resin use is increasing, although higher cost is a limiting consideration. Pheno-

lics also have special properties and are gaining in volume. They are restricted because of an inherently dark color.

One field where expoxies and phenolics show strong promise is rockets and missiles. An all-plastic solid-propellant rocket has been proposed by Harry Raech Jr. of materials research laboratory, Norair Div., Northrop Corp. As Mr. Raech states, "Times change. A few short years ago, missile engineers deigned to use plastics only in areas stipulated as secondary structures. Today, we are entering a period where it is possible that metals will be as rare in missile structures as wood now is in aircraft."

Results of SPI's annual economic questionnaire were in general exceptionally optimistic. With a successful 1959 and a planned expansion program for 1960 averaging 25%, there is every indication that the plastics industry will experience another record-making twelve months.

Heat-stable emulsifier is nonionic, and has a bland odor

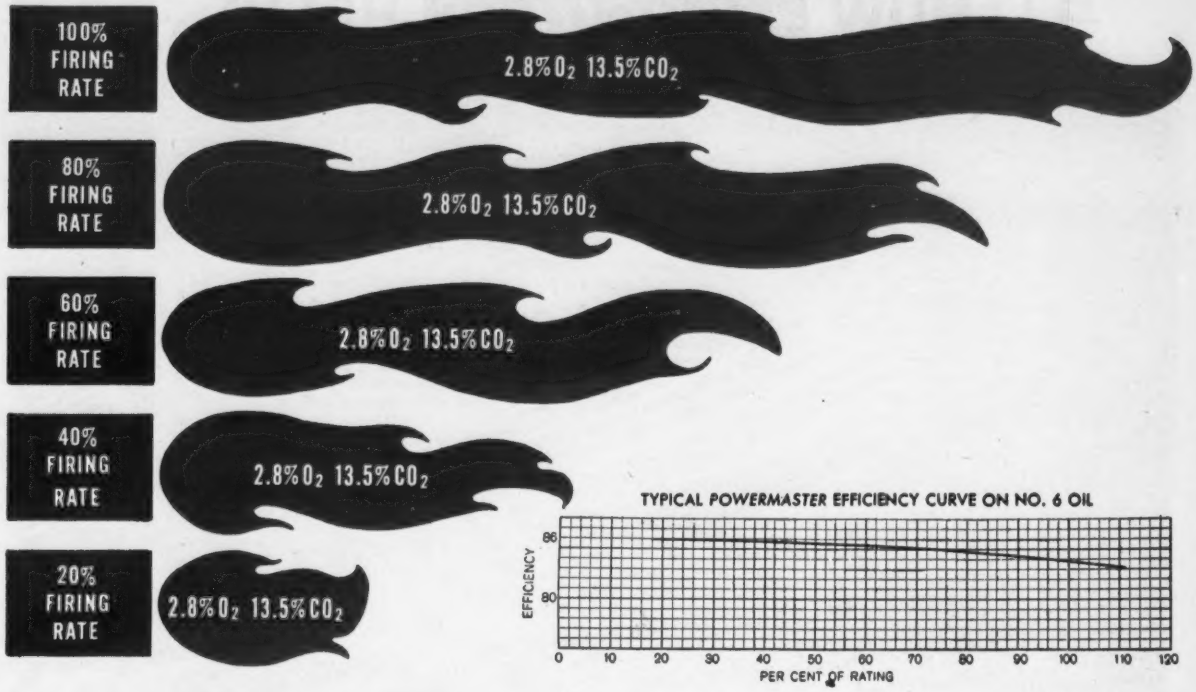
3 grades can be blended to cover complete range

Uses: Emulsifier can be used with either cationic or anionic surface active agents for such products as agricultural sprays, cleaners, plasticizers, lubricants, and floor polishes.

Features: Because product is nonionic it may be used to complement either cationic or anionic surface active agents without adversely affecting properties of either. Because the three grades available cover a wide range of properties, blending of proper grades permits a complete range of emulsifier characteristics. Material is reported to have excellent heat stability and bland odor.

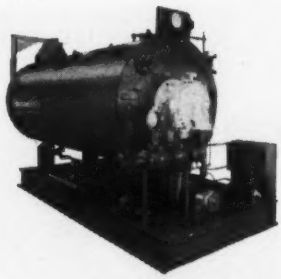
Description: Nonionic

FROM THE WORLD LEADER IN PACKAGED AUTOMATIC BOILERS AND BURNERS



Only *Powermaster*® gives you this type efficiency

Constant fuel-air ratio assures maximum efficiency at any load . . . cuts operating costs . . . returns investment faster



75th O&S Anniversary

Whether you operate a *Powermaster* boiler from a low of 20% to a high of 100% of capacity, you get the same high constant efficiency. With O&S exclusive 5 to 1 turndown, fuel-air ratio is maintained at all loads with the same low percentage of excess air (2.8% O_2) and high percentage of CO_2 (13.5%).

This constant efficiency is important to you for three reasons: 1. Lower operating costs; 2. faster return on your investment; 3. more uniform heating, more uniform process and improved product quality.

Whether your requirements are for comfort heating, process or power, you'll pay for your boiler investment faster with an O&S *Powermaster*. For information on all *Powermaster* benefits, call your nearest O&S representative or write for Bulletin 1260.

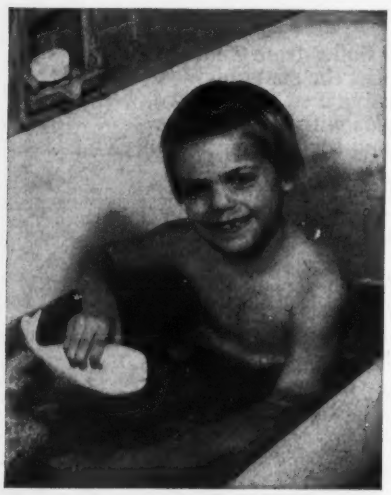
ORR & SEMBOWER, INC.
960 Morgantown Road
Reading, Pa. • Since 1885

Powermaster®
PACKAGED AUTOMATIC BOILERS

Check 1859 opposite last page.

HOW HERCULES HELPS...

CREATE NEW COMMUNITIES—The name Levitt & Sons is synonymous with neighborhood planning and home building at a rate unprecedented in this nation. In ten years this firm will have completed homes to house more than 200,000 people in three separate "Levittown" communities. To keep pace with its exacting schedules, Levitt selected multicolor lacquer based on Hercules® Nitrocellulose for interior decorating. This paint—as modern as the concept of Levittown itself—can be applied in a single spray coating over any properly primed surface. Using multicolor, Levitt has designed a system that permits one man to apply a topcoat to a minimum of 8 houses in one working day. (Multicolor lacquer for Levittown, N. J., is "Multakolor," manufactured by United Lacquer Corporation, Linden, N. J., under license from Coloramic Coatings, Inc. and their own pattern for "Multakolor.")



PROMOTE MODERN PACKAGING—Whitey, an Avon product, is a unique new container designed to package a bubble bath solution, and to serve afterwards as an appealing, durable toy. It's typical of many containers for soaps, household chemicals, drugs and cosmetic products now being made with Hi-fax®, high-density polyethylene, one of three new Hercules plastics.

PUT PERMANENCE IN PAPERS—Because of the Hercules development of HXV® chemically modified cotton linters, the rag content can now be replaced for long-lasting documents such as ledger papers, stocks, bonds, and many other important papers that are symbolic of man's achievements. HXV is only one of the many Hercules ingredients that play an important part in papermaking.

HERCULES POWDER COMPANY
INCORPORATED
900 Market Street, Wilmington 99, Delaware

CHEMICAL MATERIALS FOR INDUSTRY

GSQ-3

HERCULES

Check 1860 opposite last page.

emulsifiers are esters of selected tall oil acids and polyethylene glycols. Pour points on three grades range from plus 70°F for thickest to minus 20°F for most fluid grade.

(Peglo nonionic emulsifier is product of Pennsylvania Refining Company, Butler, Pa.)

Check 1861 opposite last page.

Delrin acetal resin made available in extruded rods

Uses: Convenient form of this thermoplastic material should be of interest to manufacturers requiring rod shapes.

Features: Availability of extruded rods up to 3″ in diameter permits utilization of Delrin's outstanding mechanical, electrical, and chemical properties.

Description: Material is easily machined (similar to free-cutting brass) on standard machine shop equipment by sawing, milling, drilling, reaming, shaping, threading and tapping. At low speeds no coolant or lubricant is necessary. It can be blanked and punched to produce smooth all-flat parts such as washers, grommets, and non-precision gears.

Convenient form of Delrin acetal resin — rods up to three inches in diameter

(Delrin extruded rods are product of Garlock Packing Company, 441 Main Street, Palmyra, New York.)

Check 1862 opposite last page.

ADVERTISEMENT—*This entire page is a paid advertisement*

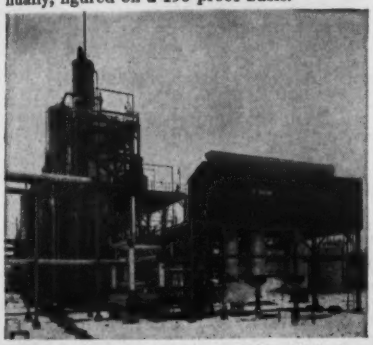
Prepared by U.S. Industrial Chemicals Co.

U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

New Ether Hydration Unit Ups U.S.I.'s Potential Ethyl Alcohol Capacity

A new ether hydration unit has just been completed at U.S.I.'s ethyl alcohol plant, Tuscola, Ill. With the new unit it is now possible for the company to take part of its ethyl ether production, formed as a by-product of the ethyl alcohol production process, and convert it to ethyl alcohol. The new unit gives the company an additional potential capacity of up to 6,000,000 gallons of ethyl alcohol annually, figured on a 190 proof basis.



New ether hydration unit at U.S.I.'s ethyl alcohol plant, Tuscola, Illinois.

U.S.I. refines a portion of the by-product ether to U.S.P., A.C.S., Refined and Technical grades for industrial, institutional and laboratory use. Part of the remaining material can now be converted into a low-proof ethyl alcohol through a catalytic process developed by U.S.I. The low-proof alcohol is then introduced into the regular process stream at U.S.I.'s alcohol plant for conversion to 190 proof or anhydrous product.

The new ether hydration unit enables U.S.I. to have a flexible means of keeping alcohol and ether production in balance. The company can serve the needs of these markets without being restricted by facilities.

Sodium Treatment Found to Increase Carbon Activity

A recent study reveals that sodium treatment of activated carbon, which is known to increase the material's ability to adsorb inert gases, also improves its liquid adsorption characteristics.

For the binary mixture n-heptane with toluene for example, toluene adsorption is increased from 48% to 58%. For n-heptane with propyl sulfide, adsorption of the latter material climbs from 25% to 85%.

The activated carbon is treated by stirring it with molten sodium until a homogeneous mixture is formed. Selectivity of the carbon is not altered.

The research group believes that sodium treatment causes small gaps to form between the carbon sheets which are generally thought to make up the structure of activated carbon. These gaps, probably made by sodium atoms wedging between the carbon sheets, give the carbon structure a honeycomb appearance. A much larger surface is thereby produced for liquid or gas adsorption.

U.S.I. Pulp and Paper Lab Expands to Cover More Bleaching Problems

Technical Service Work Now Emphasizes Use of Chlorine and Caustic Soda in Multi-Stage Bleaching of Kraft. Studies on Sodium Peroxide Bleaching Continue.

U.S.I.'s pulp and paper laboratory at Ashtabula, Ohio, established over eight years ago to provide technical service assistance on pulp bleaching with U.S.I.'s sodium peroxide, has been expanded, with the staff now working on problems relating to the use of U.S.I. chlorine and caustic soda in the multi-stage bleaching of wood pulp.

These technical service facilities are typical of the best industry laboratories maintained by pulp and paper companies themselves. Therefore, U.S.I. is able and willing to handle requests for comprehensive evaluations and recommendations on bleaching systems, techniques and chemicals—usually aimed at achieving the brightest pulp with the minimum degradation in fiber strength.

How Pulp & Paper Lab Functions

In a typical call, W. F. Schroeder, who has a very extensive background and acquaintance with the paper trade, visits a mill, examines the bleaching operation and takes pulp samples back to the laboratory.

MORE

Polyurethane Foam Radome, First Ever Built, Now Under Test in Canada

In a program designed to provide ground shelters with greater dielectric "transparency" —to minimize energy loss and boresight error in radar tracking installations—the world's first polyurethane foam radome has been built and is under test by Canada's National Research Council.

The polyurethane dome is undergoing an extensive series of electronic tests using actual field radar equipment. From these electrical analyses, NRC expects to obtain data indicating the suitability of such foam for radar at the frequencies involved. Favorable results could lead to extensive use of such foam, particularly for missile tracking in anti-missile type radar systems.

Chlorination of kraft pulp on a laboratory scale in fume hood at U.S.I.'s pulp and paper lab, Ashtabula, Ohio. W. H. Schroeder has obtained a sample of filtrate for residual chlorine analysis. J. R. Leidich is checking weight of chlorine added to pulp.

★ U.S.I. CHEMICAL NEWS ★

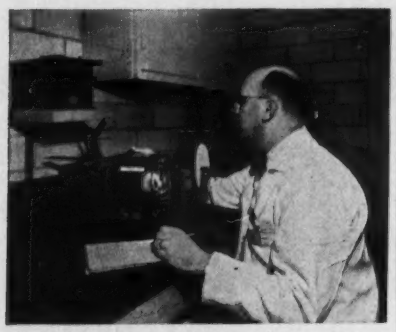
CONTINUED

Paper Laboratory

There the samples are bleached under a variety of conditions in a trial program based on knowledge of individual requirements and experience with many types of pulps. The bleached pulp samples are then made into hand sheets and tested for brightness and other necessary characteristics in a constant temperature, constant humidity testing room. Heat-aging studies can also be conducted. After all variables have been examined, a process is recommended for obtaining a bleached pulp that combines maximum brightness with maximum strength.

In the multi-stage bleaching of kraft—which usually involves treatment with chlorine, followed by caustic extraction and several whitening stages using bleaching agents such as hypochlorite, peroxide or chlorine dioxide—conditions of time, temperature, pH and pulp and chemical concentrations must be carefully worked out. U.S.I. technical service engineers are qualified to evaluate all the variables, including the type of equipment used.

U.S.I. interest in pulp bleaching arises from its sodium peroxide plant at Ashtabula, Ohio, and its two chlorine and caustic soda plants at Huntsville, Alabama. Further information on the pulp and paper technical service laboratory may be obtained by writing to U.S.I., 99 Park Avenue, New York 16, N. Y.



W. H. Schroeder determines brightness of a pulp handsheet on Hunter Multipurpose Reflectometer at U.S.I.'s pulp and paper laboratory.

Polyethylene Is Used For Radiation Shields

Polyethylene radiation shields, so thick they must be cut by specially designed saws, are being produced for use on atomic powered vessels. These polyethylene panels are intended to provide excellent protection from neutron bombardment and are lower in weight than conventional materials such as concrete and lead. The hydrogen nuclei in the polyethylene serve successfully to reduce the energy in the high energy neutrons created by atomic fission. A small quantity (1 or 2%) of boron, compounded with the polyethylene, absorbs the remaining low energy neutrons.

The polyethylene panels must meet rigid specifications and require critical quality control. They are made by a specially adapted extrusion technique which allows production of heavy gauge sheets. The shields can be made in standard widths over 36 inches and may be cut to any length according to specifications.

PETROTHENE® 100, a polyethylene resin supplied by U.S.I., is used to make the panels because of its ideal processing characteristics and because it passes all military specifications for radiation shielding.

Solox® Solvent Covered In New U.S.I. Data Sheet

Complete technical data on U.S.I.'s ethyl alcohol proprietary solvent SOLOX are given in a new, six-page data sheet. SOLOX frequently can be used in place of specially denatured alcohols because of its general utility and excellent solvent qualities. The permit and bond required for S. D. alcohols are not needed for SOLOX. It is noncorrosive, burns with a clean, colorless flame, leaves no residue and has a mild, nonresidual odor.

The new data sheet includes specifications, properties, compositions of the five SOLOX proprietory solvent formulations, and shipping information. Applications in lacquers, shellacs and varnishes, in the textile field, in chemical manufacturing, in cleaning compounds, as a fuel oil conditioner, in photography and as a fuel are described.

Government regulations pertaining to SOLOX complete the data sheet. Copies may be obtained from U.S.I. sales offices or from the New York office at 99 Park Avenue.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Protective coating systems for concrete floors compared in new coating chart. Gives resistance of each system to chemicals, thermal shock, abrasion, temperature. Shows compressive strength, impact resistance, skid properties. **No. 1580**

Silicone products for antifoams, release agents, lubricants, cosmetics, polishes, water, repellents, paints, textile finishes and electrical insulation described in new bulletin. Silicone rubber compounds also covered. **No. 1581**

New hydrogen analyzer uses hot extraction principle to determine content of the gas in metals. Said to be compact, inexpensive, and to combine speed and accuracy with ease of operation. Used for checks, controls, studies. **No. 1582**

Blowing urethane foams with fluorinated hydrocarbons discussed in new brochure. Includes advantages of making foams this way; uses of urethane foams; physical properties of blowing agent, many foamed plastics, other insulation. **No. 1583**

Latest developments in cast polyethylene film described in new booklet which deals with film-casting equipment such as chill rolls and dies, and gives a comparison of properties among cast, quenched and blown films. **No. 1584**

New miniaturized infrared gas analyzer is said to be smaller than portable TV set, to weigh only 30 pounds, to accurately measure and control furnace atmospheres, dew point, combustion, toxic and combustible gases, chemicals. **No 1585**

Two new thread sealants for storable rocket propellant systems are now available, one for nitrogen tetroxide (N_2O_4) and the other for unsymmetrical dimethyl hydrazine (UDMH). Neither is impact-sensitive in these propellants. **No. 1586**

Ozone chemistry and technology covered in collection of 60 papers presented at International Ozone Conference, now being sold. Ozone now tool for organic, analytical and photo chemists, meteorologists, plant physiologists. **No. 1587**

New gas chromotography analyzer, incorporating advanced developments such as Golay columns and ionization detectors, has been introduced. Detectors permit accurate measurement of sample components in the minute quantities resolved by the Golay column. **No. 1588**

Radioactive carbon-14 compound adenosine-8-C14 now available is a radioactive purine valuable in chemistry, biology, pharmacology. Useful in study of carbohydrate metabolism since it is a constituent of plant and animal nuclei. **No. 1589**

PRODUCTS OF U.S.I.

HEAVY CHEMICALS

Caustic Soda, Chlorine
Sodium, Metallic: cast solid in tank cars, steel drums, pails; bricks in barrels, pails.
Phosphoric Acid, Fertilizer Grade
Ammonia, Anhydrous: commercial & refrigeration. Tank cars or tank wagons.
Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions
Sulfuric Acid: all strengths, 60 Baume to 40% Oleum. Also Electrolytic grade to Federal specifications. Tank cars or tank wagons.
Sodium Peroxide

OTHER PRODUCTS

PETROTHENE® Polyethylene Resins

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

Ethyl Alcohol: Pure and all denatured formulas; Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL® M, ANSOL PR.

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Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corporation
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Durable anti-static agent resists dry cleaning and laundering

Product used in combination with epoxy resin

Uses: Anti-static agent can be used on synthetic and blended fabrics to obtain durable anti-static finish. Fabric becomes resistant to lint and dust pickup. Moisture absorbency is increased and clinging decreased. Material can also be used effectively on plastic films and sheeting.

Features: Agent is effective through a wide pH range (from four to ten). A negligible or very slight color is evidenced on whites and pastels. Excellent durability can be obtained by applying between one and two percent solids. Material is used in combination with an epoxy resin, such as Shell Chemical Corporation's Eponite 100.

Description: Finishing component, Aston 123, is applied by padding to a specific solids deposition, followed by complete drying. A light process wash is recommended following drying. Full-bodied and meaty hand results.

(Aston 123 anti-static agent is the product of Onyx Oil and Chemical Company, Jersey City 2, N. J.)

Check 1907 opposite last page.

C-14 labeled compounds with a gallic touch

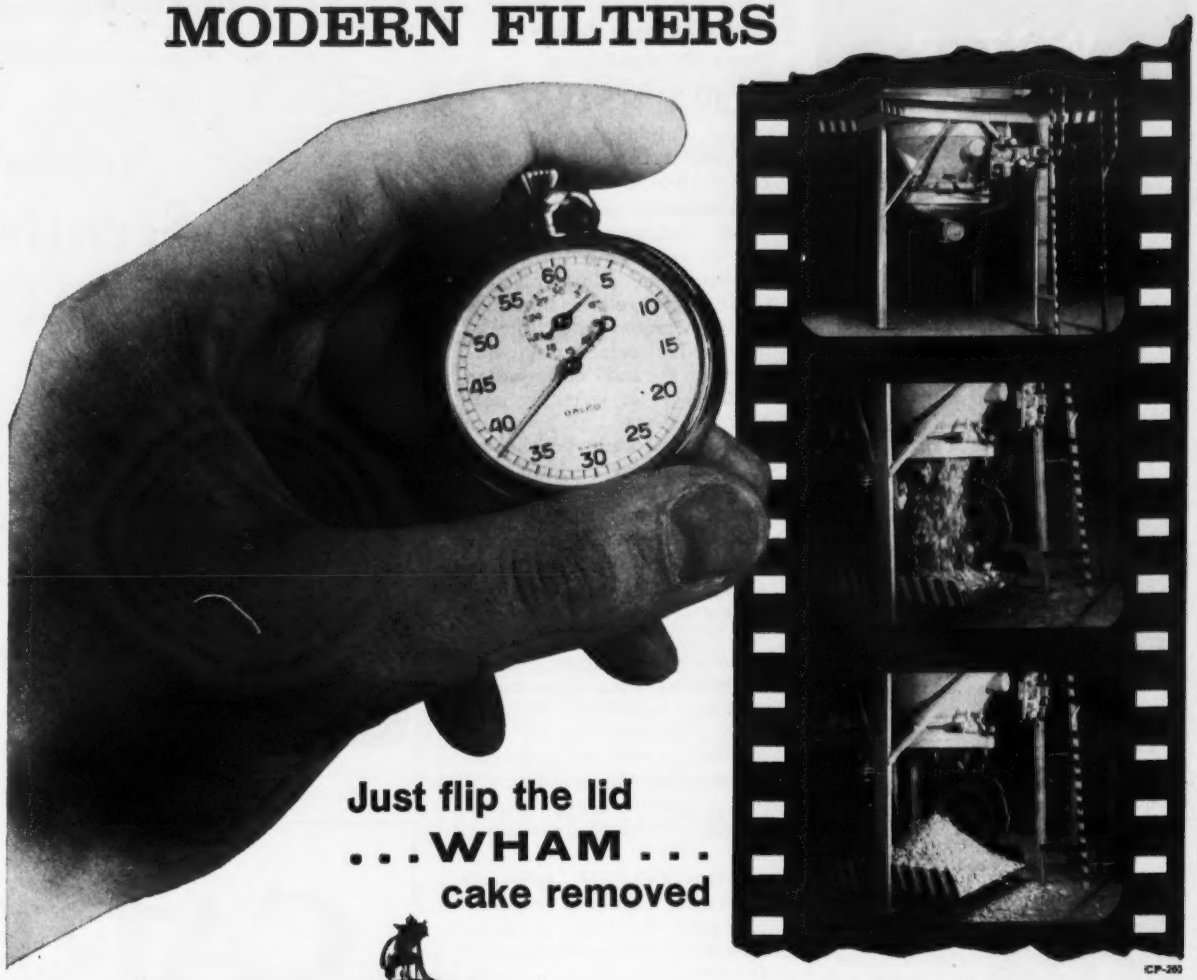
Carbon-14 labeled chemicals prepared by French chemists at Saclay are now being made available to the United States by arrangement with the Commissariat de l'Engerie Atomique, NENC.

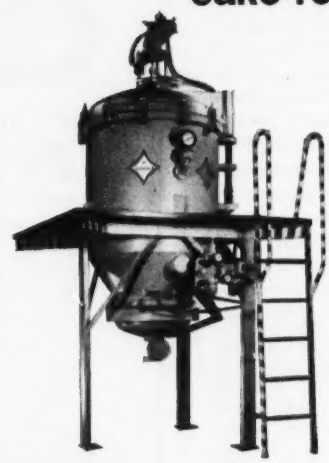
(For more information on carbon-14 labeled compounds contact New England Nuclear Corporation, 575 Albany Street, Boston 18, Mass.)

Check 1908 opposite last page.

For more information on product at left, specify 1909 . . . see information request blank opposite last page.

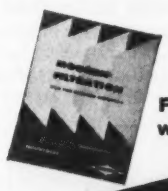
SAVE TIME and EFFORT WITH MODERN FILTERS





These rapid cleaning devices on INDUSTRIAL filters offer tremendous advantages to the user through removal of, and subsequent disposing of waste materials or recovery of valuable solids.

With VIBRA-SHOC or RECIPRO-SHOC, cleaning of your INDUSTRIAL filter is completed in minutes. The above mentioned trade named devices are obtainable on INDUSTRIAL'S TYPE 152 filters, as are such optional equipment as QUICK OPENING COVERS, LIQUID SHOC and AIR WASH, all designed with the efficiency you require for your particular operation. All these mechanical aids work for you to realize a definite cost savings based on reduced downtime, for either continuous or batch type operation. These self-cleaning devices also eliminate the manual dirty work in handling any dry, wet or semi-solid material.



For additional information write for Bulletin EP-100.

INDUSTRIAL

INDUSTRIAL FILTER & PUMP MFG. CO.
5908 West Ogden Avenue, Chicago 50, Illinois

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Check 1910 opposite last page.

DEIONIZED WATER

—from equivalent of distilled to 18 megohm quality

—from smallest laboratory to largest plant need

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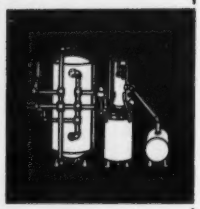
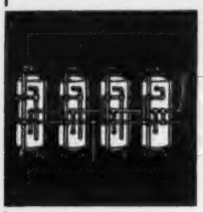
ELGIN DEIONIZERS:

JUNIOR 120
Small mixed-bed type has exchangeable refill —delivers up to 2 gpm.
Ask for Bulletin 513

ULTRA-DEIONIZER
Large mixed-bed type delivers water of high quality in any quantity.
Ask for Bulletin 512A





MULTI-COLUMN
Any combination of anion and cation exchangers in sizes to meet any need.
Ask for Bulletin H4

Whatever the purity of water you need or the quantity you desire, Elgin can supply the correct type and size ion exchange equipment to deliver it. No requirement is too small—none too large for Elgin to handle efficiently. Whether it is a standard deionizer or one specially designed for the job, you are assured of expertly engineered equipment and trustworthy service for which Elgin has been known more than a half century.

The technical assistance of the nearest Elgin representative is as close to you as your phone.

Call or write for bulletins.

ELGIN SOFTENER CORPORATION
180 N. Grove Ave., Elgin, Illinois
Representatives in Principal Cities
In Canada: G. F. Sterne & Sons, Ltd., Brantford

Check 1911 opposite last page.

CHEMICAL MATERIALS

Four inhibitors debut: three UV stabilizers; and an antioxidant

Four inhibitors, aimed at the plastics field, have recently been introduced.

Hexamethyl-phosphoric triamide (inhibitor HPT) is a non-absorbing ultraviolet stabilizer for vinyl plastics. Clear, light-yellow liquid is easily incorporated in formulations for calendering, extruding, and compression molding. It is infinitely soluble in water, all common plasticizers, and both polar and non-polar solvents. Tests have indicated effective protection against degradation during a period of 7 years outdoor weathering.

Resorcinol monobenzoate, (inhibitor RMB) has proved effective as an ultraviolet stabilizer in cellulosic plastics. Weathering tests show that a cellulose acetate butyrate film stabilized with this product is still in good condition after 36 months outdoor exposure in Arizona. Product does not impart color to plastic.

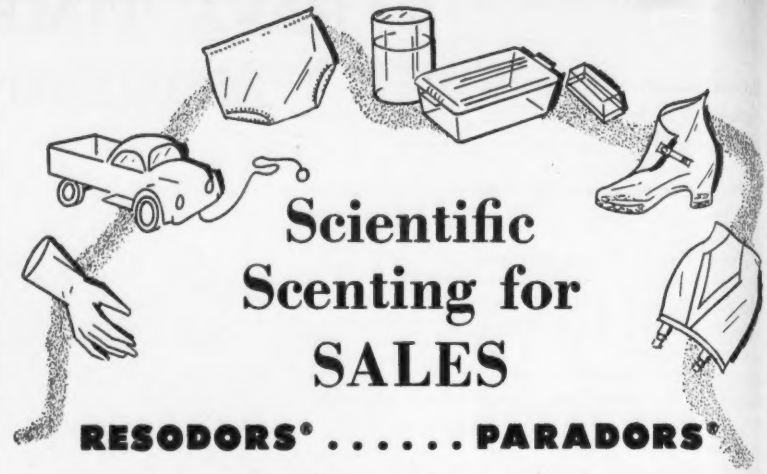
p-Octylphenyl salicylate (inhibitor OPS) is intended primarily for use in polyethylene and polypropylene. It serves to reduce photo-oxidation. It combines good compatibility in both resins with very effective protection.

Trihydroxy butyrophenone (inhibitor THBP) is an effective antioxidant for polyethylene, polypropylene and various paraffin waxes. Crystalline solid can be added directly to synthetic resins during milling, or can be dispersed in suitable solvent. Accelerated tests indicate that 0.1% of antioxidant will increase stability of polyethylene more than 2½ times.

All four of these inhibitors are presently available in development quantities.

(Inhibitors HPT, RMB, OPS and THBP are products of Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Company, 260 Madison Ave., New York 16, N. Y.)

Check 1912 opposite last page.



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Consumers are invariably guided by *first impressions* . . . and in plastic and rubber household goods, a repulsive odor can arouse displeasure —*even before* a product is used.

Fresh, clean fragrances . . . economically provided by RESODORS and PARADORS . . . sell *and resell* plastic and rubber products. Objectionable odors are gone and the customer's first encounter with your product is *a pleasure.*

Insure consumer acceptance with RESODOR and PARADOR fragrances. Several types are available, all residual, heat stable and harmless to tensile strength or color. Write Sindar, describing your product, for samples and technical service.

SINDAR® *Corporation*
Industrial Aromatics and Chemicals

321 West 44th Street
New York 36, N. Y.

Check 1913 opposite last page.

CARDOX®

For CARBON DIOXIDE

BULK LIQUID

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Over 60 conveniently located CO_2 supply depots, supported by fleets of trucks and rail cars, insure reliable service and supply—regardless of your needs.

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Check 1914 opposite last page.

Why They Read CHEMICAL PROCESSING

One of a Series

". . . we are always anxious to evaluate new materials which might have application in our products . . ."

'CP is excellent source of information for new chemical materials'

"LET'S face it — as a research engineer, it's doubly important for me to keep up with developments in my field. Things are moving mighty fast today . . . I can't afford to fall behind. Experience has shown me that one of the best ways to keep informed of significant happenings in the chemical processing industries is to read CHEMICAL PROCESSING magazine."

These comments were given to us by Kenneth R. Larson, Research and Development Engineer for United States Gypsum Company. Headquartered in Chicago, Mr. Larson is primarily concerned with new product development, product improvement and technical service. His company is a leading manufacturer of gypsum building products. It also makes lime, paint, insulation, roofing, siding, acoustical and metal products. At present, the research laboratories are located in Chicago, but the firm is now building a new research center in Des Plaines, Illinois, a northwest suburb of Chicago.

"I have found CP to be an excellent source of information for new chemical materials," continues Mr. Larson. "We are always anxious to evaluate new materials which might have application in our products. I also find the Idea Section quite interesting. A new technique employed in a particular application might very well be the germ of a new idea for us."

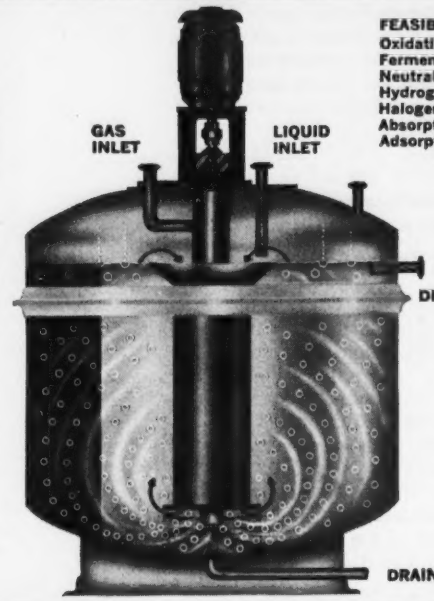
Ken tells us that he has been receiving CP regularly for over four years. He makes it a point to read each issue as soon as he can. Nor is he alone in his enthusiasm . . . Ken states that CP is read with great eagerness by a number of other members of the U.S.G. research staff. Their interest is evidenced by the fact that they all receive their own private copies

NOW! GAS-LIQUID TRANSFER at 40-50% ABSORPTION EFFICIENCY*

SINGLE POWER SOURCE for introduction of atmospheric air or gas and rotation of the specially designed impeller (rotor).

THE DRAFT TUBE provides positive and continuous vertical circulation of total liquid in vessel . . . reentrains escaping gas by vortex action.

ROTOR DESIGN differs from all agitator impellers . . . deliberately creates a defined zone of gas-liquid contact which has been considered by some to resemble the phenomenon of cavitation.



FEASIBLE USES:
Oxidation
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Absorption
Adsorption

NEW CAVITATOR® Gas Diffuser

Here is a brand new method for performing gas-liquid contacting, solids-liquid or liquid-liquid blending operations. This combination mechanical aeration and agitation unit—the Cavitator—accomplishes all phases of transfer: introduction and diffusion of gas, mixing and internal circulation.

The Cavitator is flexible, too, operating in closed or open systems and in continuous or batch processes. Standard sizes range from 4600 to 23,000-gallons liquid volume. You can buy or rent small units for lab testing and pilot plants. Find out what it can do for you.

*Efficiency Comparison Based On Tests With Air In Aqueous Na_2SO_3 Solutions†

Equipment	O_2 Absorption Efficiency	KWH/Lb. O_2 Absorbed
Unit A	15.2	0.21
Unit B	6.8	0.25
Unit C	13.5	0.20
Unit D	5.1	0.46
Unit E	14.0	0.53
Unit F	10.5	0.23
Unit G	25.0	0.38
Unit H	10.0	0.33
CAVITATOR††	46.0	0.29-0.30

†Eckenfelder, Chem. Eng. Progress, Vol. 52, July 1956, page 286.

††Cavitator data from Yeomans Research and Development Studies.

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Application_____

D-6025

Check 1915 opposite last page.

rather than wait for the magazine to be circulated.

A graduate chemical engineer from the University of Wisconsin, Mr. Larson lives with his wife and three daughters in Mt. Prospect, Illinois. He joined the company in 1946. His interests are photography and puttering around the house. He is also active in civic affairs.

Systems that function well above 400°F made with epoxy novolac resin

Uses: Resin was developed for laminating, casting and adhesive applications. It can be used in all applications where conventional epoxies are now being used but where higher temperature resistance is desirable.

Features: Using this resin, systems that function well at temperatures above 400°F can be formulated with common epoxy curing agents. Product combines useful physical and handling properties of conventional epoxies with high-temperature performance of phenolic resins.

Description: Epoxy novolac resin, D.E.N. 438, is a soluble phenol-formaldehyde formulation. It is available in truck-load quantities at $0.68/lb. Solutions in acetone and methyl ethyl ketone are also available.

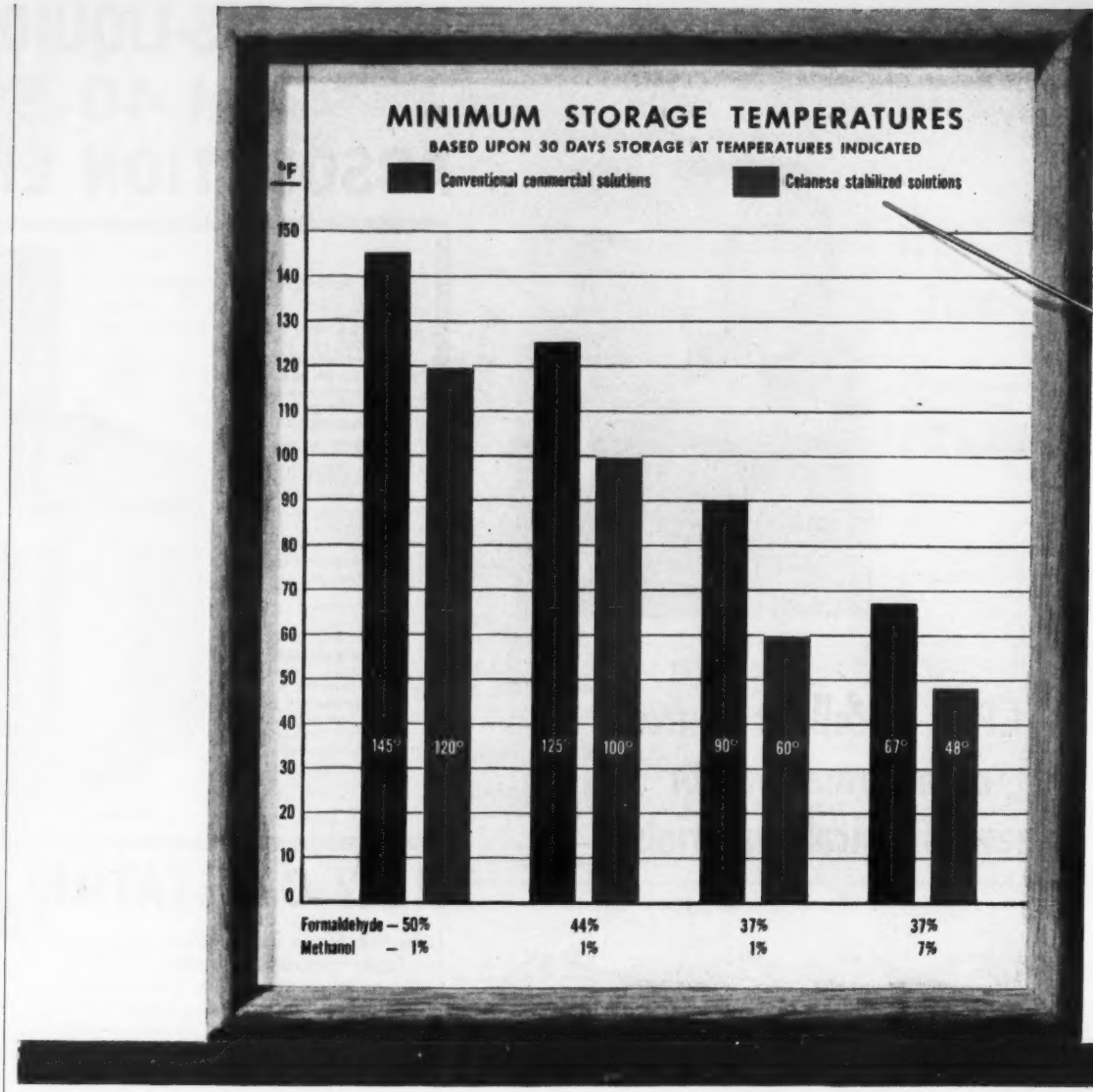
(D.E.N. 438 resin is product of Dow Chemical Company, Midland, Michigan.)

Check 1916 opposite last page.

High trans content and reactivity in chloro butene

Uses: High reactivity of compound makes it suitable for use in wide variety of syntheses. Reactions suggest potential markets in rubber, petroleum, electroplating, pharmaceutical and textile industries.

Features: Chloro butene contains an exceptionally high amount of trans isomer — 95 to 98% by weight. Compound



STABILIZED

As you see . . . !

The red bars?

Those are minimum storage temperatures for Celanese stabilized formaldehyde.

And the black?

Same thing for conventional HCHO solutions.

What does this show?

Stabilized Celanese formaldehyde solutions can be stored—and shipped—at much lower temperatures!

What does that mean for me?

Significant savings in steam and heating costs for storing formaldehyde!

Any detrimental effects on end products?

On the contrary! Products are often improved. Better, clearer resins are frequently made. This stabilization maintains formaldehyde at lower acidity levels . . . prevents loss of concentration.

Any other gains?

Cuts maintenance costs, too! It reduces clouding, precipitation of paraform, and gumming of formaldehyde tank bottoms. The stabilized chemical goes back into solution time after time if storage temperatures drop below recommended minimums.

How about price?

It costs no more! And it's been thoroughly field tested.

Sounds wonderful! When do you deliver?

Right now! And all you need!

is a "double-barreled" allylic chloride. Both chlorine atoms undergo reactions typical of allylic halides, in a number of instances allylic rearrangement occurs.

Description: Chemical is 1, 4-dichloro-2-butene. It is a clear liquid that reacts with tertiary amines to produce high yields of bis-quaternary compounds.

Displacement reactions with organic and inorganic salts occur readily. Potassium thiocyanate gives the thiocyanate; silver nitrate gives the dinitrate; and sodium acetate gives the diacetate. Diethers are readily made when chemical is treated with alcohols in strongly alkaline solution. Price range is $0.37 to $0.39/lb.

(Dichloro-2-butene is a product of Industrial Biochemicals Department of E.I. du Pont de Nemours & Co., Wilmington 98, Delaware.)

Check 1918 opposite last page.

Polyvinyl chloride foam owes uniformity to continuous process

Uses: Product is well adapted for use in quilted products, shaped cushions or similar items where uniformity is required.

Features: Foam is produced by a continuous, chemically blown process which gives a sheet of consistently uniform quality.

Description: Polyvinyl chloride foam can be compressed and heat sealed. Low-density material is available in continuous lengths, up to 48″ wide and thicknesses as small as ⅛″. A wide range of density specifications can be met. Vinyl foam is not subject to aging deterioration and offers resistance varying from good to excellent to acids, alkalis, grease and oils, high humidity, sunlight, water and air.

(High-Vi polyvinyl chloride foam is product of Highside Foam Products, Inc., 10 Colfax Avenue, Clifton, New Jersey.)

Check 1919 opposite last page.

FORMALDEHYDE

Well said, Mr. Salesman. But don't forget that our good customer will want a reminder of other Celanese achievements in formaldehyde, such as low-cost paraformaldehyde and Formcel solutions (formaldehyde in various alcohols). He may be interested in higher concentration stabilized aqueous solutions now that they can be shipped at lower temperatures. Point out that we welcome every question on the subject of formaldehyde—and are ready to help him with the answers!

For more information, write to: Celanese Chemical Company, a Division of Celanese Corporation of America, Dept. 591-D, 180 Madison Avenue, New York 16, N.Y.

Celanese® Formcel®

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver.
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Ave., New York 16.

Celanese CHEMICALS

Check 1917 opposite last page.

Free! Sample Tube of MOLYKOTE® G LUBRICANT

Industry's NEWEST Production TOOL

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
- THE HIGHER THE LOADS, THE GREATER THE MARGIN OF SUPERIORITY OF MOLYKOTE G

Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA-MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone Fireside 8-3724. Plants in Stamford, Conn., Munich, Germany and Strasbourg, France.

THE ALPHA-MOLYKOTE CORP.
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Please send me a free sample of your MOLYKOTE G Lubricant.

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CITY_____ ZONE____ STATE_____

MOLYKOTE G LUBRICANT

Check 1920 opposite last page.

Fibrous resins

Vinyl and styrene polymers in form of highly oriented fibers are now available in developmental quantities. Fibrous resins are being evaluated as binders for non-woven textiles and in preparation of specialty papers, in pulp and paper molding, and in laminates.

Fiber lengths vary from very short to a maximum of 3/16 inch. They are very irregular in shape with diameters ranging from two to two hundred microns.

(Fibrous resins are product of Union Carbide Plastics Company, Division of Union Carbide Corporation, 420 Lexington Ave., New York 17, N.Y.)

Check 1921 opposite last page.

Offer wide density range in rigid and semi-rigid urethane foams

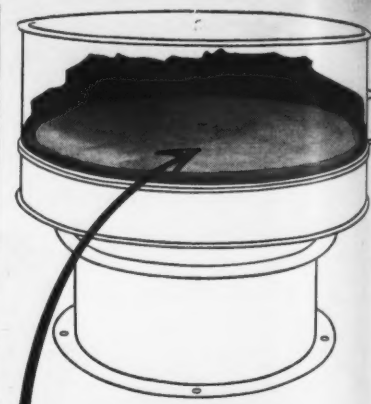
Uses: Void filler for flotation or insulation purposes. Foams have also been used as a packaging material for perishable goods and delicate instruments.

Features: Urethane prepolymers are available in density ranges from 2 to 25 lbs per cu ft.

Description: Lower densities of these rigid and semi-rigid urethane prepolymers (Vultafoams) are freon blown. Typical properties for a 2 lb/cu ft product are: K factor 0.11 to 0.14 btu/hr/sq ft/in/°F; foam time 2 to 5 min; hardening time 10 to 15 min; cure room temperature.

(Vultafoam urethane prepolymers are product of General Latex and Chemical Corporation, 666 Main Street, Cambridge, Mass.)

Check 1922 opposite last page.



Save Time and Money

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On rescreening of tension rings of vibrating machines for solids or solids-liquid separation, you can truly cut costs with Multi-Metal.

LARGE STOCK — Multi-Metal offers a complete selection of screening material in industrial and bolting cloth grades in all alloys, mesh and wire combinations.

FACILITIES AND "KNOW-HOW" in rescreening rings to assure uniform tension, maximum screening efficiency and service life.

Let us quote on your next tension ring rescreening job. You'll be pleased with Multi-Metal quality, price and delivery. Write for Catalog 57.

MM MULTI-METAL WIRE CLOTH CO., INC.
1356 GARRISON AVENUE
NEW YORK 59, N. Y.

Check 1923 opposite last page.

NEW LITERATURE

Chemical Materials

Cast polyethylene film developments are detailed in booklet of 12-pages which deals both with film casting equipment and a comparison of properties among cast, quenched and blown films. Processing variables and their effects on film properties are discussed. "Cast Film" — U.S. Industrial Chemicals Co., Div., National Distillers and Chemical Corporation.

Check 1924 opposite last page.

Epoxy-glass laminates bul lists property values for glass-base, epoxy-resin laminated plastics and copper-clad laminates. Included are physical, mechanical and electrical properties. Bul 51.5.18, 51.5.19 — Taylor Fibre Co.

Check 1925 opposite last page.

Wool fulling and scouring are subject of technical bulletin on use of surface active agent Sterox 21-K. Performance comparisons, use procedures and physical and chemical properties are included. Bul I-179 — Inorganic Chemicals Div., Monsanto Chemical Company.

Check 1926 opposite last page.

Radio chemicals catalog includes information on atomic waves, buffer tables, filter selection for Colorimetry. 1960 catalog — Subet Laboratories, Inc.

Check 1927 opposite last page.

Polyvinylpyrrolidone's uses in pharmaceutical-tablet manufacture are described in 16-page technical bulletin which contains information on characteristics and structure of the material, discusses improved compression capacities and gives typical sample granulation formulas. Bul AP-89 Rev—Dyestuff and Chemical Division, General Aniline & Film Corporation.

Check 1928 opposite last page.

Dewaxing and deoiling aids for petrolatum and wax stocks are described in bulletin. "Separaides" —L. Sonneborn Chemical & Refining Corp.

Check 1929 opposite last page.

Plasticizers are subject of 32-page catalog which contains a guide to plasticizer selection, resin compatibility tables and charts detailing performance characteristics. A section is devoted to preparation of film for testing and test methods. Cat L-104 — Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Company.

Check 1930 opposite last page.

NATIONAL AIROIL BURNER

ENGINEERING NEWS

NATIONAL AIROIL BURNER CO., INC. • 1284 E. Sedgley Ave. • Philadelphia 34, Pa.

You may wish to check certain items in this advertisement and forward to those concerned in your company.

ROUTE TO:

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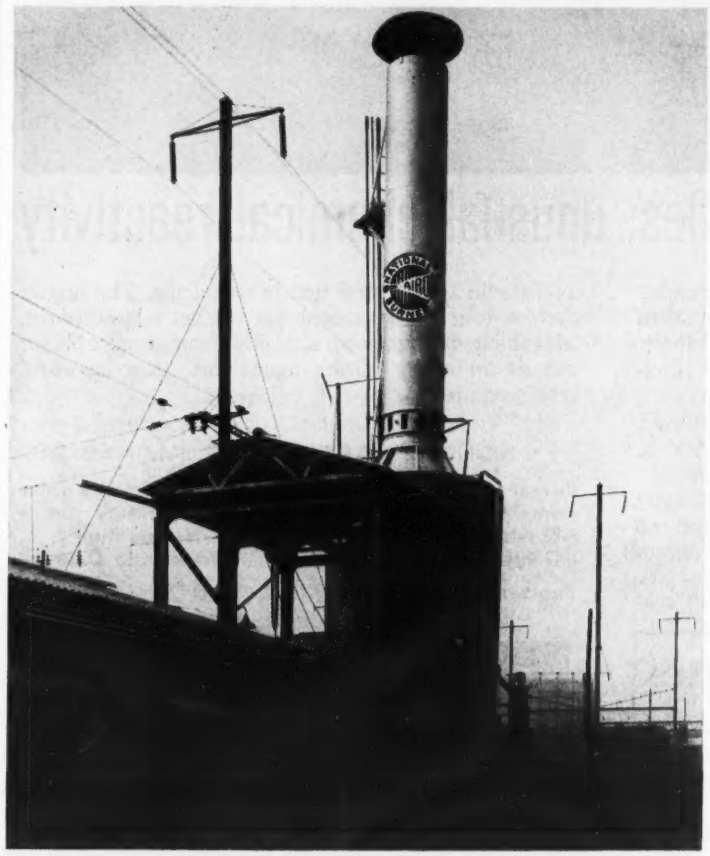
NAB Combustion Research Laboratory... Proving Ground for Burner Design Changes

Over the years, National Airoil Burner Company has expanded and improved its research and development testing facilities to meet changes in design requirements for oil and gas burners and accessories in a variety of industries, including petroleum, chemical, power and others.

This modern Combustion Research Laboratory provides an excellent proving ground, not only for design changes in existing burner designs, but for finding better solutions to new problems. For example, many reported difficulties in burning certain types of gas and heavy fuel oils, including viscous residuums, have been solved successfully for industrial installations throughout the world.

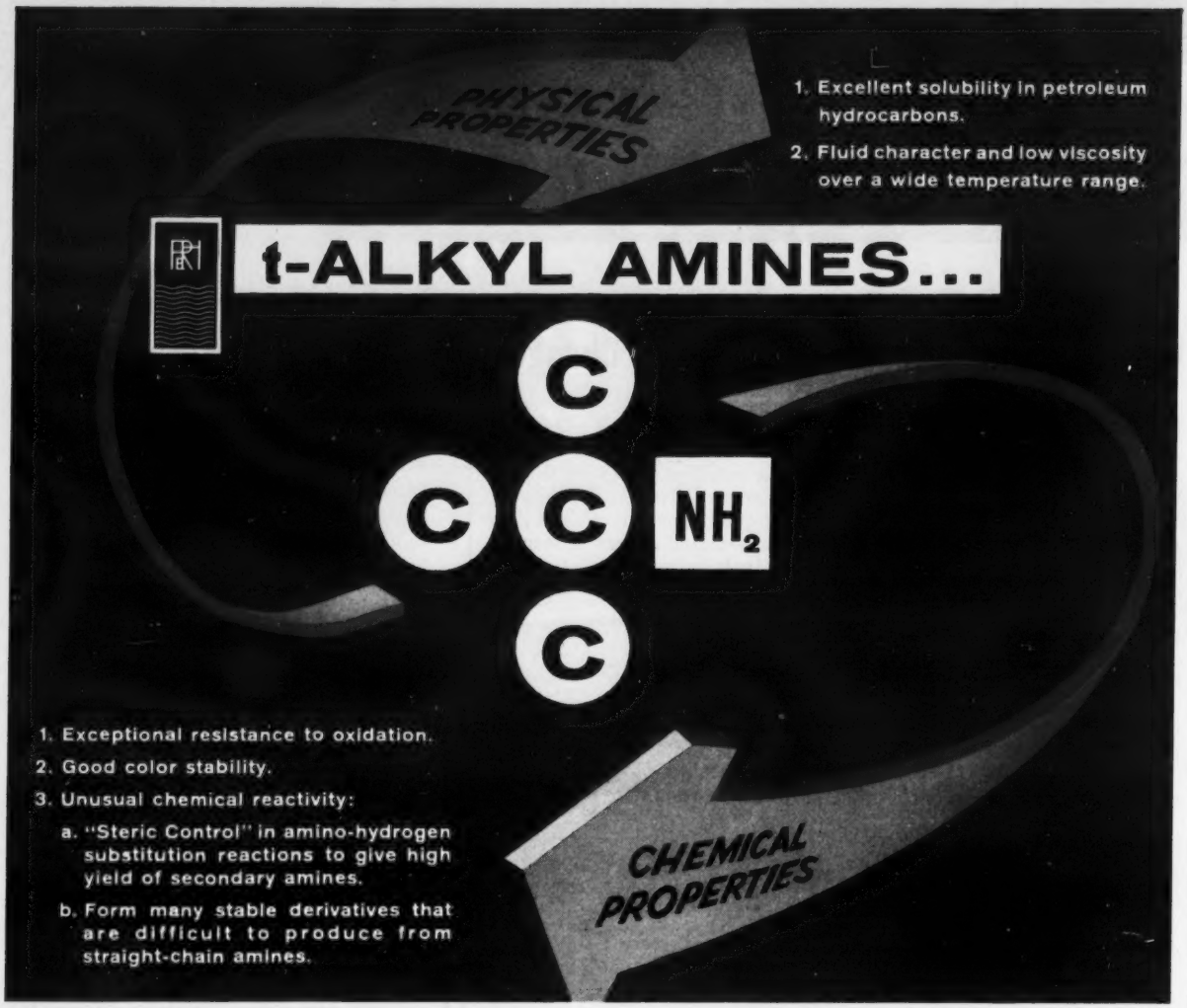
As a result of this careful testing, you are assured of a complete line of quality products, each performance-tested before it reaches your installation. Bulletin 759 shows how the many facilities of this modern combustion research laboratory can help solve your particular industrial burner problem. Write for a copy. No obligation, of course.



Typical Combustion Tests Conducted Recently:

- For a large heater-furnace manufacturer for use in a major Caribbean petroleum refinery; vertical firing National Airoil Dual Stage oil burners of high capacity having a low atomizing steam consumption in a fresh water scarce area. Fuel is heavy, high temperature asphalt bottoms.
- For a large oil refining company and its fuel oil marketing organization; horizontally fully automatic rotary oil burners firing a mixture containing various proportions of otherwise unsaleable residues from propane deasphalting.
- Special vertical firing combination oil and gas burner units adapted to automatic combustion control for petroleum and chemical heaters-furnaces where maximum fuel economy is paramount along with a quick change-over of fuels.
- Vertical and horizontal firing oil burners using various grades of hydro carbon fuel gas under high pressure as the atomizing medium in place of, or alternately with, steam and compressed air.
- A series of steam atomizing #6 oil burning units for a wide turn down and employing uncommonly high oil pressure at the low capacity rates to improve the functioning of the automatic control, at the same time realizing a lower atomizing steam consumption throughout the entire wide range.
- Gun type mechanical atomizing oil burners with full automatic control on residual fuel oil or low pressure gas in a pressurized combustion chamber as applicable to direct fired air heaters and latest type pressurized boilers.
- Inspirating and non-inspirating gas burners with a varying percentage including up to 100% of hydrogen for vertical and horizontal firing in oil refineries and ammonia making plants.

Check 1931 opposite last page.


PHYSICAL PROPERTIES
1. Excellent solubility in petroleum hydrocarbons.
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1. Exceptional resistance to oxidation.
2. Good color stability.
3. Unusual chemical reactivity:
a. "Steric Control" in amino-hydrogen substitution reactions to give high yield of secondary amines.
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Useful physical properties; unusual chemical reactivity

t-Alkyl amines are distinctly different from straight-chain primary amines in both physical and chemical properties. The highly branched structure of the t-alkyl amines gives you the unique physical properties; the attachment of the amino group to a tertiary carbon, the unusual chemical reactivity. Rohm & Haas t-alkyl amines are available in commercial quantities in a wide range of molecular weights. The lower amines are useful as intermediates in making surface-active agents, gasoline and oil additives, pharmaceuticals, corrosion inhibitors, flotation agents, rubber chemicals, insecticides, dyestuffs, anti-static agents, and textile chemicals. The higher amines are ideally suited for use as oil additives. Menthane diamine is an alicyclic diamine suitable for use as an epoxy curing agent and as a chemical intermediate.

ROHM & HAAS t-ALKYL AMINES

Primene 81-R: 12-14 carbon t-alkyl primary amine
Primene JM-T: 18-22 carbon t-alkyl primary amine
t-Butylamine **t-Nonylamine**
t-Octylamine **Menthane Diamine**

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LITERATURE and SAMPLES

Explore the potential of these amines by writing to Dept. SP-17 for samples and a 44-page book giving detailed information on many useful reactions.

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Check 1932 opposite last page.

CHEMICAL MATERIALS

Performance of isophthalic in fields of surface coatings and plastics products is detailed in two brochures, one for each field. "Plastics Materials Brochure" and "Coating Materials Brochure" — Oronite Chemical Company, subsidiary of Standard Oil Company of California.

Check 1933 opposite last page.

Waxes and polymers along with company's facilities, policies and price list are presented in data folder. "At Your Service" — The Western Petrochemical Corp.

Check 1934 opposite last page.

Wood particle binder resins bulletin indicates possible uses of melamine-urea and melamine resins in wood flour molding. "Wood Flour Utilization" — Plastics and Resins Div., American Cyanamid Company.

Check 1935 opposite last page.

Guide to silicone products is available in eight-page illustrated bulletin. Major product uses and benefits are listed. A special section is devoted to silicone rubber. Bul CDS-129B — Silicone Products Department, General Electric Company.

Check 1936 opposite last page.

Light-stable styrene polymers properties are summarized in technical service bulletin. Describes performance data and presents information on various techniques used to evaluate the product. "Lustrex" Bul — Plastics Division, Monsanto Chemical Company.

Check 1937 opposite last page.

Comprehensive guide to products available is tabulated in four-page, easy-to-use chart. It tabulates physical properties and methods of shipment for 15 products. "Product Guide" — Union Carbide Olefins Company, Div. of Union Carbide Corporation.

Check 1938 opposite last page.

Polypropylene technical data is presented in four bulletins which lists electrical and chemical properties of polymer in two bulletins; general physical, extrusion and injection properties in the other two. "Polypropylene Bulletins" — Avisun Corporation.

Check 1939 opposite last page.

Isotope index is now available in fourth edition. Index lists source of every known commercially available isotope as of July, 1959. Complete purchasing information is supplied. "The 1959 Isotope Index" is available at $5 from Scientific Equipment Co., PO Box 19086, Indianapolis 19, Ind.

Polyvinyl acetate and polyvinyl alcohol resins as tablet coatings and granulating agents are subjects treated in technical bulletin available from Department J. A., Shawinigan Resins Corporation.

Check 1940 opposite last page.

Functional listing of over 3700 organic chemicals is presented in 52-page booklet intended as a companion piece for regularly published catalog which lists compounds in alphabetical order. "Eastman Organic Chemicals — Classified by Functional Groups" —Distillation Products Industries, Division of Eastman Kodak Company.

Check 1941 opposite last page.

Holmium metal data sheet contains properties of this rare earth metal including melting and boiling points, crystal structure, atomic radius and magnetic moment. Cat sheet 611 — Research Chemicals Division, Nuclear Corporation of America.

Check 1942 opposite last page.

Polypropylene booklet is an up-to-date summary of physical characteristics, mechanical properties, chemical resistance and electrical properties of this material. "Profax" — Hercules Powder Company, Inc.

Check 1943 opposite last page.

Starch derivatives, Kofilms, are detailed in 64-page manual on chemistry and industrial utilization of these products prepared by directly linking acetyl groups to starch molecules. Kofilms booklet — Paper Division, National Starch and Chemical Corporation.

Check 1944 opposite last page.

Styrene resins, used in paint are described in 30-page technical report containing characteristics, compounding procedures and applications. Compatability, chemical resistance and physical properties are also included in Paint Bul 5 — Marbon Chemical Division of Borg-Warner Corporation.

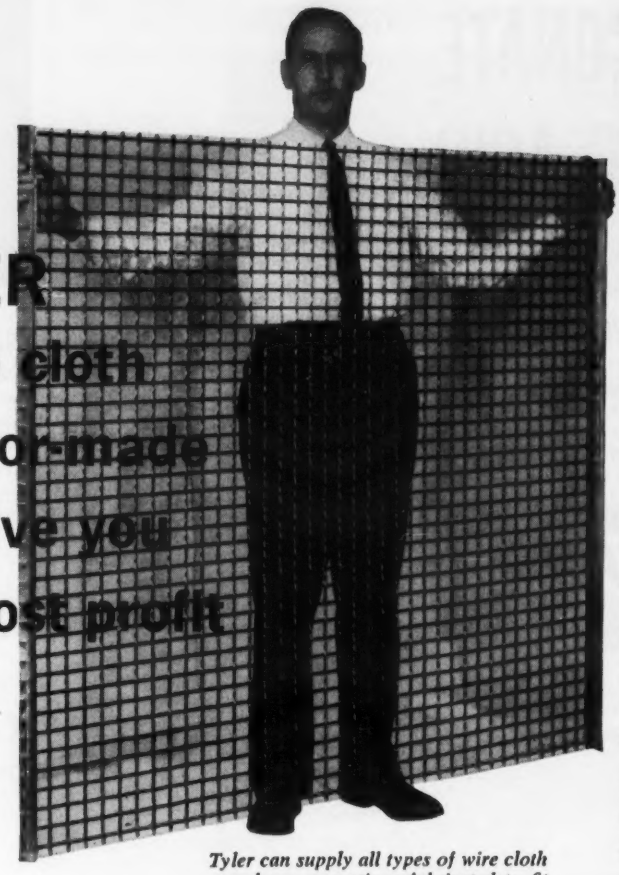
Check 1945 opposite last page.

Fungi and mildew attacks on various products, and how to fight them, are outlined in 4-page bul "Bactericides and Fungicides" — Metalsalts Corporation.

Check 1946 opposite last page.

Epoxy novolac resin is subject discussed in technical bulletin that includes properties, formulations, uses and handling procedures. "Epoxy Novolac D.E.N.438" — Dow Chemical Company.

Check 1947 opposite last page.



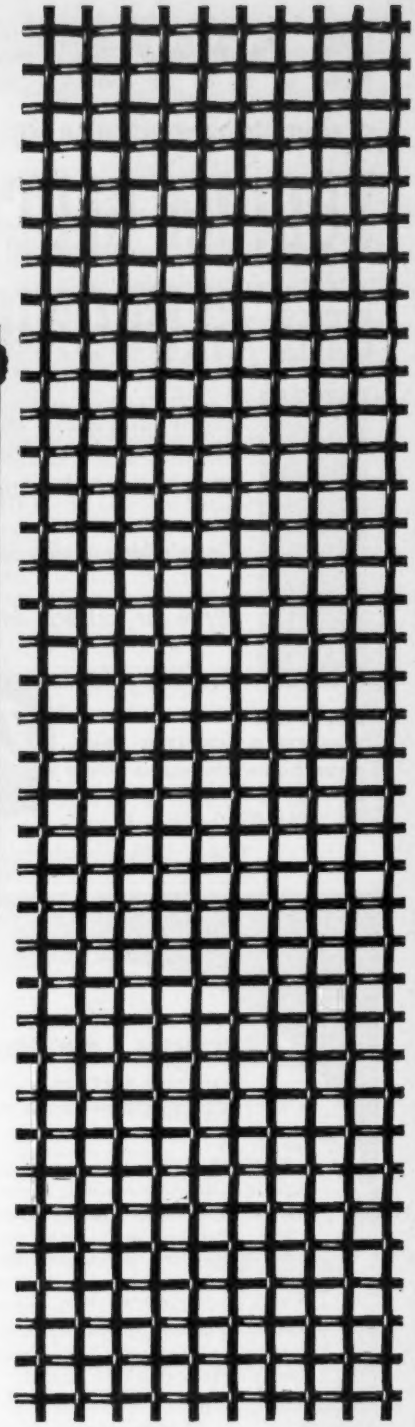
TYLER wire cloth is tailor-made to give you the most profit

Tyler can supply all types of wire cloth — and screen sections fabricated to fit every existing type of vibrating screen.

Tyler does more than manufacture 53,000 different specifications of wire cloth. It starts by designing the specifications to solve each problem to your greatest profit.

Selection and control of the metal is important—especially where corrosion, abrasion, or contamination are factors. Tyler controls the design of all metals and alloys used in weaving, and in addition operates its own wire mill for processing all its non-ferrous and many of its stainless steel wires. Tyler Screens are literally tailor-made for maximum profit to the user.

Ask your Tyler representative for full information—through him you'll get *Tyler Screening Service.*



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Check 1948 opposite last page.

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a dependable source for

SODIUM GLUCONATE and GLUCONIC ACID

Promptly available in any quantity.

Warehouse stocks across the country.

Dawe's high quality is assured.

Write for technical data and samples.

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Dawe's

Check 1949 opposite last page.

TWIN LEADERS

IN THE METHYL ETHYL KETONE PEROXIDE FIELD

LUPERSOL® DDM (60% methyl ethyl ketone peroxide in dimethyl phthalate), known for long term stability and uniform catalytic activity, is a readily soluble, convenient liquid catalyst for polyesters. For "room temperature" curing with this peroxide, the polyester resin should contain a cobalt accelerator. LUPERSOL® DELTA (60% methyl ethyl ketone peroxide in dimethyl phthalate), noted for producing faster gel and cure times with cobalted polyesters, is especially effective in cold weather.

Write for Data Sheet

LUCIDOL DIVISION
WALLACE & TIERNAN INCORPORATED
1740 MILITARY ROAD
BUFFALO 5, NEW YORK

Check 1950 opposite last page.

CHEMICAL MATERIALS

Laminated plastic sheets, rods, and fabricated parts are discussed in eight-page engineering booklet which includes properties and uses. Catalog 20.000.13 — The Richardson Company.

Check 1951 opposite last page.

Tributyl aconitate is subject of three-page technical data sheet giving properties, applications, toxicity and packaging information. Data Sheet 552 — Chas. Pfizer & Co., Inc.

Check 1952 opposite last page.

Rubber-like urethane is subject of four-page technical brochure which includes charts showing physical properties, applications and advantages. "Daycollan" — The Dayton Rubber Company, Urethane Division.

Check 1953 opposite last page.

Textile wet processing products are featured in booklet titled, "Time for a New Look at New Materials" — B. F. Goodrich Chemical Company.

Check 1954 opposite last page.

Silicone carbide and boron nitride are two of 26 products summarized in technical data folder which presents significant advances in materials resistant to abrasion, chemicals, corrosion, nuclear radiations and high temperatures. "Products Summary" — The Carborundum Company.

Check 1955 opposite last page.

Water absorption characteristics of non-black reinforcing fillers are discussed in 27-page technical report. A comparison is drawn between fine-particle silica and commercially available sodium silico aluminate. Hi-Sil bul 19 — Columbia-Southern Chemical Corporation, Subsidiary of Pittsburgh Plate Glass Company.

Check 1956 opposite last page.

Rare earths and heavy minerals are among 46 chemical and metallurgical products contained in brochure describing products and services of — Vitro Chemical Company Div., Vitro Corporation of America.

Check 1957 opposite last page.

Element tungsten bibliography is now available. It includes references appearing in U.S. and foreign publications from 1953 to 1958. Book contains 44 pages with 409 references. **"Tungsten"** is available at $1 from Chemical and Metallurgical Division, Sylvania Electric Products Inc., Subsidiary of General Telephone & Electronics, Towanda, Pa.

FULL CONE—HOLLOW CONE—FLAT SPRAY

Spraco has the most complete line of nozzles available anywhere — **IN STOCK.** Capacities range from ⅛ pint/min. to 4000 gal./min. Bronze, cast iron, and stainless steel. Write for our nozzle catalog.

SPRAY ENGINEERING CO., 105 Cambridge St., Burlington, Mass.

Check 1958 opposite last page.

Convenient, too!

THE MODERN CONTAINER WITH BUILT-IN APPLICATOR TOP

SPREADS EASILY, QUICKLY, WITHOUT DRYING . . .

STAYS IN PLACE UNTIL ASSEMBLY.

Leak Lock . . .

the joint sealer to use with CONFIDENCE!

Use Leak Lock on threads, flange surfaces. It works where other joint compounds fail . . . will NOT heat spontaneously . . . withstands solvents that eat away other "sealers" . . . stays flexible, withstands shocks, prevents joint freezing. Sold in 4-oz. can—1⅓ oz. squeeze tubes—pint and 10-lb. containers.

For free sample, write on letterhead giving us the name of your local Industrial Distributor.

Listed by Underwriters' Laboratories for gas, oil, propane and butane equipment.

HIGHSIDE CHEMICALS INCORPORATED
16 COLFAX AVENUE • CLIFTON, NEW JERSEY
See our ad in Chemical Engineering Catalog, page 377.

Check 1959 opposite last page.

Industrial Images Often Altered by Basic Chemical Research

WILLIAM R. WHITE, Market Analyst
Hornblower & Weeks

Discoveries in chemical-research laboratories have completely changed the fundamental environments of some industries. Witness the impact on rubber-tire makers of the introduction of synthetic materials, thus releasing domestic producers from dependence on foreign crude. This freed them from the threat of recurrent inventory write-offs, caused by wide price fluctuations in foreign supplies. They have now enjoyed unequaled prosperity for more than a decade.

A similar transition is taking place in the carpet industry. Through aggressive research and experimentation, synthetic textiles have been developed. These enable carpet and rug manufacturers to substitute rayon, acrilon and other man-made fibers for carpet wool previously imported from South America and the Orient.

Economies have resulted from stabilization of raw-material costs, as well as from introduction of mechanization made possible by utilization of synthetics. Carpet makers have thus held down prices of soft floor coverings to levels permitting retention of large consumer markets and affording satisfactory profit margins.

To take full advantage of developments dictating the need for construction of modern factories, the industry gradually has shifted virtually all of its operations to the Southeast.

More advantageous labor rates prevailing in the South have contributed to manufacturing economies. As a result, prospects for two representative concerns constituting the major portion of the industry have brightened.

Mohasco Industries represents a consolidation of Alexander Smith, Inc., one of the oldest carpet makers in the country, and Mohawk Carpet Mills. It is considered the world's largest carpet producer. Mohasco accounts for between 15 and 20% of domestic output. Since moving principal manufacturing operations to the South and modernizing facilities, the company has become one of the most aggressive merchandisers of floor coverings. Sales increased about 11% last year to $101.2 million and are expected to improve further this year.

Debt has been reduced from more than $50 million (at the time of the 1955 merger) to about $13 million. Working capital has been increased to about $41 million from some $28.5 million five years ago. Management resumed dividends last year at a quarterly rate of 5 cents a share. Payments were raised to 10 cents quarterly late in 1959. In addition, an extra dividend in stock of 10% was distributed.

Brighter prospects of attaining stability in carpet-making set the stage for a decision by Burlington Industries to acquire James Lees & Sons Company. Lees is the largest U.S. carpet yarns producer and second leading domestic carpet and rug manufacturer.

Burlington is considered the largest textile producer in the country with sales of $805 million in the fiscal year ended October 3, 1959. Slightly more than half of volume is contributed by apparel. About 20% represents household furnishings. Net profit for 1959 came to $2.72 per share, against $1.21 in 1958. This encouraged hope of consideration by directors of an increase in the $1.20 annual rate.

(For further information on chemical stocks write Hornblower & Weeks, 40 Wall St., New York 5, N.Y.)

Check 1960 opposite last page.

WE WEAVE ACCURATE
"WORKING OPENINGS"
IN WOVEN WIRE SCREEN AND WIRE CLOTH PRODUCTS
Whether you are grinding, sizing, scalping, dewatering or filtering it's the accuracy of the "working opening" that makes the difference in woven wire screen and wire cloth products. We pride ourselves in weaving accurate "working openings", an engineered screening surface to meet your specification.
First, the best metal or alloy is selected—hard enough to withstand the abrasive action—ductile enough not to break under stress. Next, the best wire diameter and crimp are determined. Then we weave wire screen or wire cloth around accurate "working openings" best suited for your screening application.
FREE! Write for bulletin 160 giving complete details and facilities.
THE CLEVELAND WIRE CLOTH & MFG. CO.
3571 EAST 78th STREET • CLEVELAND 5, OHIO

Check 1961 opposite last page.

KNOX
TOWER PACKINGS
Designed for Service!
Raschig Ring
Berl Saddle
Single-Partition Ring
Tellerette
Cross-Partition Ring
More than 35 years production experience in the field of fine quality porcelain, plus the finest of materials . . . That's KNOX!
Tower Packings by KNOX resist high temperatures, fumes, vapors, corrosion, liquids, alkalies and acids. Non-porous—complete vitrification firing at 2300° F. provides zero porosity, assuring an indefinite life chemically. Combined with uniform quality, high chemical purity, iron-free, great mechanical strength, will not crumble.
Body composition excells the most exacting requirements.
IRON FREE
KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE
Always Specify KNOX Tower Packings

Check 1962 opposite last page.

CONTROLS CORROSION *in Gas Scrubbing Systems!*

Vancoram Sodium Metavanadate

($NaVO_3 \cdot xH_2O$)

Corrosion has been effectively controlled in nitrogen gas and carbon dioxide generators where sodium metavanadate has been employed. In an alkaline amine system for absorbing acid gases, sodium metavanadate helps to form an insoluble oxide coating which protects the closed circuit process from attack by corrosive by-products.

In a typical nitrogen gas system, the monoethanolamine solution containing 10 to 15 lb. of Vancoram Sodium Metavanadate, requires replacement only once a year. Both equipment and solution are protected to a far greater degree than by any other additive.

Write for further information about Vancoram Sodium Metavanadate as a corrosion inhibitor in alkaline amine systems.

VANADIUM CORPORATION OF AMERICA
Producers of alloys, metals and chemicals
420 Lexington Avenue, New York 17, New York
Chicago · Detroit · Cleveland · Pittsburgh

Check 1963 opposite last page.

EXECUTIVE REPORT #6

FILTER FABRICS THAT DEFY THE ELEMENTS

No problem is too tough for Wheelabrator® Dustube® Collectors

High temperatures, corrosive or abrasive contaminants in the collected gases pose no insurmountable problems for Wheelabrator Dustube Collectors. These efficient cloth bag type collectors are made exceptionally versatile by use of synthetic filtering fabrics of treated glass, Nylon, Orlon, Dacron, etc., which afford long service life and optimum resistance to acids, alkalis or abrasive materials encountered in any specific application. For example, with Wheelabrator Glastube® collectors employing glass filter fabric tubes, temperatures up to 550° F. can be accommodated.

Dustube Collectors offer high efficiency and low cost for equipment and operation

Collection efficiencies uniformly above 99% by weight and 95% by discoloration test are regularly achieved by Dustube systems in a wide range of applications. For engineering information write to Wheelabrator Corp., 478 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ontario.

Check 1964 opposite last page.

Plant Costs

From page 21

design of the process plant, and management. But let us not leave the matter strictly in the realm of communications and human relations. In every design project, someone must sooner or later say, "All right, let's go ahead now, assuming that these conditions and compositions will be provided." Until there is developed better knowledge of the actual dynamics of process plant operations and the kinnetics of reactions involved, such assumptions must be at best only guesses, the accuracy of which is closely related to the company's or the designer's experience with similar process units in the past.

A great deal depends on what the designer believes management wants. Where an understanding of risk is shared by both, some measures to hold down the extent of risk can be taken. Or, if bottlenecks appear, their elimination can be taken in stride. But if management wants over-all planned capacity soon after startup, it can be provided — but at a cost.

Price Squeeze

This brings us to the other major area for attempted cost reduction of processing plants: Buying of equipment at lower prices.

Some major manufacturers of engineered process plant equipment are expressing increasing concern at what they believe to be a growing trend: Attempts by some customers to force down the prices of processing equipment through the playing of one competitive bidder against another.

Assuming that process operating company managements are just as entitled to try to save money this way as through eliminating overcapacity and overpiping, and that occasional tightening up is good for any segment of the economy, then one may well ask: 1) What are the chances of getting equipment for substantially less, and 2) What risks are involved?

Admittedly, direct savings can sometimes be had by

To page 88

THAT'S INTERESTING

Adheres to theory

Jacob J. Bikerman, internationally-known expert on adhesive joints at Massachusetts Institute of Technology, is making non-stick substances highly adhesionable, and thereby substantiating a different theory.

His theory is that one material fails to adhere well to another because chemical impurities and low-weight molecules cause tiny "boundary layer" to form between flat surface the two. Since this thin surface film is weak, stress causes a break or tear along the film.

By chemically removing the impurities, Bikerman has made polyethylene cling tenaciously to metals, glass and plastics.

Synthetic penicillin

Synthetic penicillin, in tablet form for medical use, has been developed by Bristol Laboratories. It is so potent that it may make injection of antibiotic obsolete, according to developer.

AGAIN

P-K Internal-Fin Coolers can be furnished insulated with Rock Cork laid in asphalt and covered with a heavy steel jacket. Illustration shows insulated cooler.

Revere helps fit the metal to the job

AND PATTERSON-KELLEY CUSTOMERS SAVE 3 WAYS

Because of its unique design, the Patterson-Kelley Freon Water Cooler shown at right above saves space, requires less Freon, while its reduced weight and size mean lower cost.

With the P-K Type FO Internal-Fin Freon 22 Water Cooler the installation can be designed for a shell 2 diameters less and 1 to 2 feet shorter than with conventional plain or bare tube coolers. This is made possible by the use of ¾" O.D. x .035" gauge Revere copper tube drawn over a Revere aluminum extruded fin as shown above. Serrated surface of the fin enhances refrigerant vaporization.

By making both the tube and the extruded fin, and assembling them in the same plant a tight contact between the two metals is assured, thus establishing maximum heat transfer. Once again Revere has helped fit the metal to the job, money was saved and a more efficient product produced.

Why not consult with Revere's Technical Advisory Service and take advantage of its extensive knowledge in "fitting the metal to the job." This Service has saved others money, why not you?

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Mills: Rome, N.Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities. Distributors Everywhere.

Check 1965 opposite last page.

Plant Costs

From page 86

being tough with bidding suppliers. The risk, however, is in getting inferior pieces of equipment, or equipment that simply isn't sufficiently rugged or highly developed to function without heavy maintenance. Result: Higher maintenance expense.

Engineering on Cuff

Frequently, substantial applications engineering work is required to be done without charge by each bidding equipment supplier.

Sometimes, as many as a dozen bidders will each spend tens of thousands on applications engineering studies reported in detail with their bids, with all but the low bidder losing out from winning back any of the cash outlays.

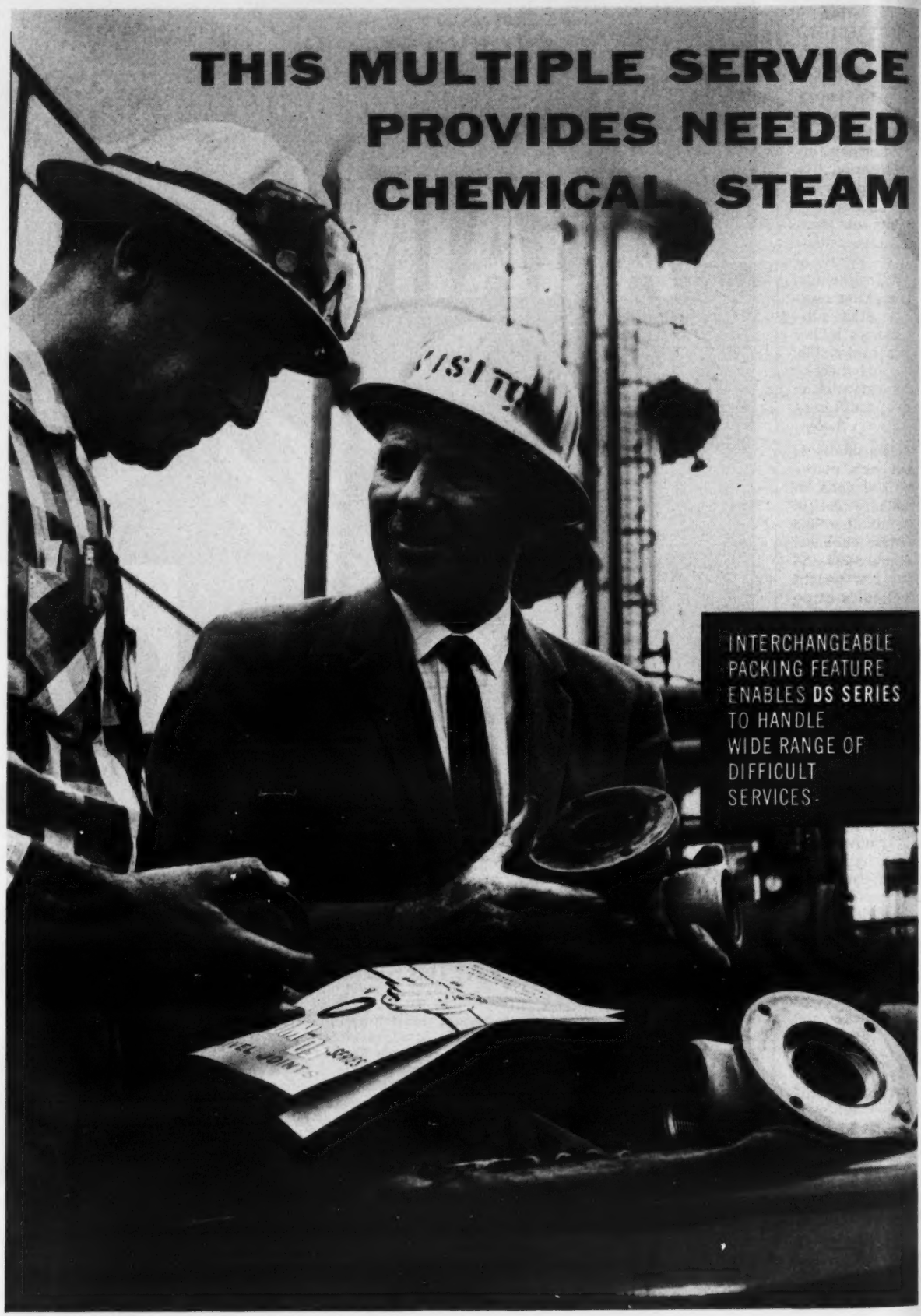
Somewhat rarer, according to the equipment people, is the type of case recently cited where the two bidders not qualifying as "low" received within two weeks of the awarding of the bid, checks for $40,000 for their applications engineering studies — which each privately estimated had cost upwards of this figure! This, however, must be likened to a windfall.

Here, it would seem only businesslike for the prospective bidders to *arrange beforehand* with the purchaser an understanding that applications engineering costing the bidder an estimated $xxxx will be suuplied with the bid.

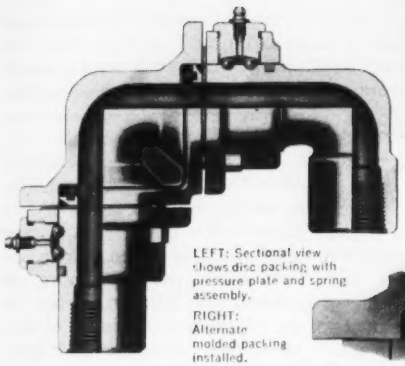
Consequences

Manufacturers of engineered processing equipment say their costs have risen to levels from which they can now make reductions only by curtailing such services as: 1) Pre-sale and post-sale engineering services to clients, 2) research and development, and 3) participation in the engineering community in which they currently and traditionally have substantial roles.

Even with pressure on for reduction of prices, equipment manufacturers report no re-



CHIKSAN SWIVEL JOINT FLEXIBILITY IN ALMOST ANY OR HOT GAS SERVICE



LEFT: Sectional view shows disc packing with pressure plate and spring assembly.

RIGHT: Alternate molded packing installed.

You'll find a good answer

to fluid line flexibility problems in the new Chiksan DS Swivel Joint. This versatile new joint offers maximum safety, complete flexibility and reduction of maintenance costs. Designed to use either disc or molded type packings, the DS Swivel Joint now permits packing changes in the line without removal of ball bearings.

You reduce your inventory

requirements because the same joint, with a change of packing, can be quickly adapted to any number of chemical, steam, or hot gas services in your plant. In large installations, substantial savings may be realized by reducing the inventory of joints.

Reduced maintenance costs...

Chiksan DS Swivel Joints require only routine lubrication to assure long service life. To save maintenance down-time repacking can often be done in the line. General servicing can be handled by regular shop maintenance personnel.

Let Chiksan help you

plan your installation design. Whether your need is for a chemical loading rack, for stress relief lines, for lines subject to expansion, settling or torsional stresses, or as a connection between stationary and rotating equipment, Chiksan field representatives are ready and qualified to render immediate technical assistance. For more information on these multiple service swivel joints, write to Chiksan or fill in the coupon below.

THE TABLE BELOW IS A QUICK GENERAL REFERENCE FOR THE CORRECT PACKING FOR SPECIFIC SERVICES:

PACKING	SERVICE	TYPE
Neoprene	Recommended for alkaline and acid salt solutions and aldehydes such as formaldehyde.	Molded
Hycar	These should be used for petroleum derivatives, neutral or slightly acidic salt solutions, dilute acids (Sulfuric to 50%, Hydrochloric and Nitric to 20%), alcohols, glycols, ethers, gases (Oxygen not over 500 psi), and vegetable oils.	Molded
Butyl	Recommended for liquid or anhydrous ammonia, gases (except oxygen over 500 psi), ammonia derivatives such as hydrazine and for certain hydraulic fluids such as Pydraul, Skydrol, and Cellulube. It is recommended for acetone and methyl ethyl ketone.	Molded
Teflon	For highly oxidizing fluids, esters, and ketones, and other fluids not handled by elastomers.	Disc
Asbestos	For use in saturated steam service.	Disc
Viton "A" (BBB)*	For high temperature fluids, aromatics, liquid chlorine and other halogens, tetra ethyl lead, chlorinated hydro-carbons such as carbon disulfide, molten sulfur, etc. Do not use for esters or ketones. This compound should give good service to 400°F.	Molded
Viton "A" (DDD)*	Recommended for strong acids such as concentrated sulfuric, red fuming nitric, and hydrochloric. This compound should give good service to 350°F. Do not use for esters or ketones.	Molded
Metallic	For extreme services such as hot gas at 600°F., a Stainles Steel metal disc, specially treated to prevent galling, is recommended.	Disc

* BBB and DDD are Chiksan compound identification letters.

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CHIKSAN COMPANY, 330 North Pomona Ave., Brea, California

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CHIKSAN fmc

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Check 1966 opposite last page.

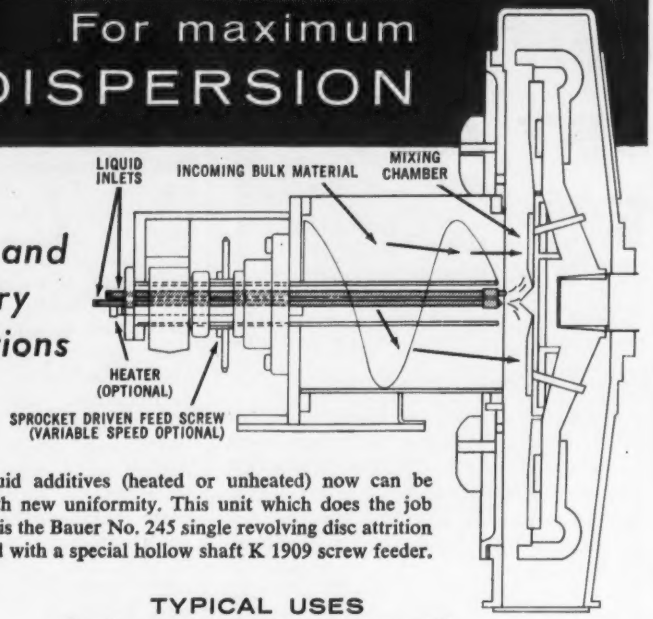
duction in demand for pre-sale and post-sale engineering services. With ever-growing complexity of processes and need for more precise performance-scaling of their equipment, these manufacturers undoubtedly know they should be broadening rather than curtailing their R&D . . . even to the extent of planning participation wherever possible in cooperative studies of the process dynamics of their equipment in operating plants. Then too, a fertile field for their making a badly needed contribution to the dynamics of individual items of equipment (such as heat exchangers) is through sponsorship of university research — an activity which will further increase rather than reduce their costs.

In the engineering community, much could be lost if the equipment manufacturers were not to take an even stronger part in the attractive utilization of qualified, bright young engineers, and in the support of the programming and other activities of our major professional societies.

Dilemma

So it can be seen that the plant-cost reduction role of process operating company management is not an easy one. Except for setting aside temptations to over-install for tomorrow's expansions which may — but may not — materialize, each avenue to significantly reduced capital costs is lined with technical risks, any of which might offset desired capital advantages. Perhaps the true solution will be an evolutionary one — resulting from efforts now being directed at better understanding process dynamics, and reaction kinetics, as well as computer simulation and control of processes. In the meantime, better coordination of and cooperation among *all* who take part in the decisions resulting in new processing plants seems the safest, quickest way to managements' immediate capital conservation needs.

For maximum
DISPERSION
in dry and semi-dry operations



Multiple liquid additives (heated or unheated) now can be dispersed with new uniformity. This unit which does the job so efficiently is the Bauer No. 245 single revolving disc attrition mill equipped with a special hollow shaft K 1909 screw feeder.

TYPICAL USES

Blending chemicals, feeds, wood flour, molding powders, fertilizers, insecticides, and similar processes. Write for details.

THE BAUER BROS. CO. / SPRINGFIELD, OHIO

Check 1967 opposite last page.

New MARSH
"Master Test" SERIES

Twin-tip pointer enables observer to read "dead-on" by lining up twin tips like gun sight.

Unprecedented accuracy and dependability in test gauges developed to meet today's exacting requirements. Each gauge individually *dead-weight tested!* Guaranteed accurate within ¼ of 1% plus or minus of maximum dial reading over entire range.

Mirror dial also insures accurate "dead-on" reading.

"Non-parallax" dial has Plexiglas insert that assures accurate reading even when read at angle.

New "Read-easy" dial (patent pending), as illustrated above, assures reading accuracy in keeping with indicating accuracy. Also note three advanced means of reading available in all "Master-test" gauges: twin-tip pointer, mirror dial, and "non-parallax" dial as shown opposite.

Sizes 4½", 6", 8". All standard pressure ranges 0-15 psi to 0-30,000 psi, vacuum and compound.

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Division of Colorado Oil and Gas Corporation

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Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas

Check 1968 opposite last page.

Watching Washington

Federal Labeling Legislation Nears Actuality

Hopes are high that a good workable household-substances labeling law will come out of this session of Congress. The primary purpose of proposed legislation is to establish standards for the labeling of hazardous substances used in and about the household which are not regulated by existing law. It has been under consideration for some five years.

Early in the current session the Senate Interstate and Foreign Commerce Committee reported favorably on a bill (S.1283) to regulate labeling of potentially hazardous household substances. Amendments suggested by the CPI and interested industries were incorporated in the revised, reported legislation.

On the other side of Capitol Hill, the House is considering its own bills along these lines —among them H.R. 5260. Industry, pleased with the outcome on the Senate side, has asked the House to include suggested amendments in its legislation. While there are still problems to be ironed out, industry, government and medical groups are endorsing the legislation in principle.

The hazardous Substances Labeling Act would repeal the outmoded Federal Caustic Poison Act of 1927. This lists 12 chemical substances required to be labeled. Today, according to one industry witness, there are an estimated 15,000 to 20,000 chemicals in household use.

The bill reported by the Senate Committee defines a hazardous substance and the terms used in this definition —"toxic," "corrosive," "irritant," "strong," "sensitize" and "flammable." An additional category of hazard is defined as that which "generates pressure through decomposition, heat, or other means." The term "highly toxic" is also defined and will determine those substances on which the word "Poison" must be used.

The intent of the definition of a "hazardous substance" is to bring within the scope of the bill those substances which, as packaged, may cause substantial personal injury or substantial illness during or as a proximate result of any customary or reasonably foreseeable handling or use. This includes ingestion by children whenever such is reasonably foreseeable (and the bill recognizes that it is often reasonably foreseeable).

A container of any hazardous substance intended or suitable for household use, which is not labeled in accordance with the requirements of the bill, would be considered a misbranded package. These packages would be subject to seizure and condemnation. Criminal penalties are provided for failure to comply with labeling requirements.

Provision is made for the Secretary of Health, Education, and Welfare to adopt regulations for the efficient enforcement of the act. The Secretary would also be authorized to establish reasonable variations, or additional or less-stringent labeling requirements, if he found them necessary for the protection of the public health and safety.

Economic poisons subject to the Federal Insecticide, Fungicide and Rodenticide Act, and foods, drugs and cosmetics subject to the Federal Food, Drug and Cosmetic Act would be exempt from the definition of hazardous substance. These substances are already regulated by existing legislation.

HEW-FDA has asked that the labeling requirements of the bill be expanded to include foods, drugs and cosmetics. They argue that the Federal Caustic Poison Act which the new legislation would repeal applies the labeling requirements of the law to foods, drugs and cosmetics. The bill as reported by the Senate Committee specifically excludes this trio from its requirements. Also, the committee does not propose to accept HEW's suggestion that corresponding amendments to the FD&C Act, "to close a loophole in the law," be inserted in the bill as a separate Title II.

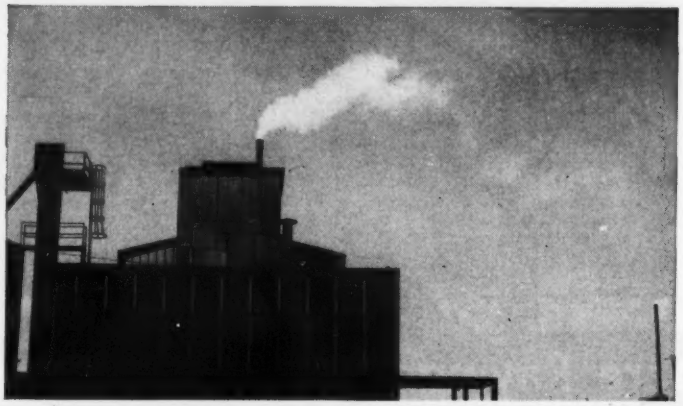
Finally, the bill would require that the label of any hazardous substance in a container intended or suitable for household use show the name and address of the manufacturer, packer or seller; the name of the hazardous ingredient; a signal word, "Danger," "Warning," or "Caution"; a statement of the hazard; a statement of the precautionary measures; instructions for first-aid treatment (when necessary or appropriate); the word "poison" on any substance defined as "highly toxic"; instructions for handling or storage of packages which require special care in handling or storage; and the statement "Keep out of the reach of children," or its practical equivalent.

In principle, everyone seems satisfied with the proposed legislation. However, although at one time it looked as though a compromise would be reached, the American Medical Association and the chemical industry are still at odds on specific points.

AMA has asked that the scope of the bill be extended to include packaged chemicals "for non-manufacturing purposes." The CPI considers extension of coverage unwise, since the additional products which would be covered would be those classified as commercial or industrial.

Before scrubber was installed — visible cloud is composed largely of water with about 0.5% sulfur trioxide

THE CHEMICO VENTURI SCRUBBER MAKES THE BIG DIFFERENCE



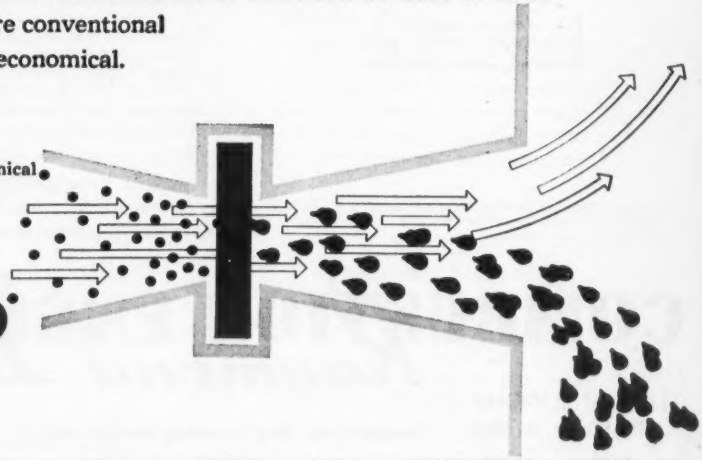
After scrubber was installed — water vapor has diminished considerably, sulfur trioxide content is practically nothing

With sulfur trioxide fumes being vented to the air in a thick vapor fog, Ansul Chemical faced an air pollution problem common to many chemical producers. They were willing and anxious to comply with community requests for pollution control, but they were unable to find a scrubber which could rid the stack of both the water vapor and the SO_3 as well.

While virtually any scrubbing device was capable of removing the water vapor, only the Venturi scrubber was effective in removing the acid fumes. By removing all but the last traces of SO_3 the Venturi scrubber gave further evidence of what can be done to solve really tough gas cleaning problems where conventional cleaning devices prove ineffective or uneconomical.

FULL DETAILS AVAILABLE

For your copy of a brochure giving complete data on Chemico Venturi gas scrubbers, or for technical assistance on a specific problem, write to Chemico at the address below.



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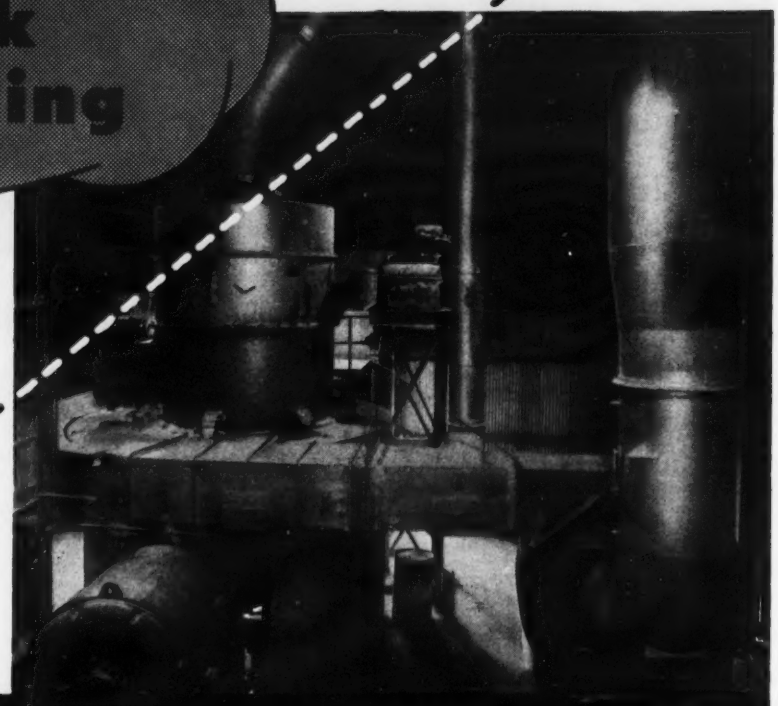
Check 1969 opposite last page.

phosphate rock grinding



Raymond Super Roller Mill at Lake Charles Harbor and Terminal District, Lake Charles, La. — pulverizing phosphate rock.

—where Raymond Roller Mills are *FIRST*

For complete details on Roller Mills, write for Raymond Catalog No. 79.

The use of Raymond Roller Mills for grinding phosphate rock has multiplied tenfold in the past fifteen years.*

Today more than 200 Raymond installations, similar to the set-up above, are capable of handling better than 16 million tons yearly in the various grades specified for acidulation, acid production, and direct application to the soil.

This industry-wide acceptance is based on the ability of Raymond equipment to pulverize all grades and mixtures . . . to provide a range of capacities for large or small plants . . . and to produce a uniform finished material with characteristic Roller Mill economy.

Lowest in initial cost, power cost, and overall cost of operating.
Automatic dust-free operation with minimum attention.
Ease of fineness control, and optimum particle size distribution.
Combined drying, grinding, separating and conveying in one simple operation.
Minimum space requirements, and flexibility of installation to fit plant layout.
Dependable long service life and continuous trouble-free operation for extended runs.

If you are producing phosphate materials, chemicals, pigments, clays, synthetic resins or various manufactured products—refer your grinding problems to Raymond engineers.

* Latest figures show that Raymond Roller Mills can handle better than 16 million tons yearly based on 350 two-shifts a day operation.

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Combustion Engineering-Superheater, Ltd., Montreal, Canada

SALES OFFICES IN PRINCIPAL CITIES

Check 1970 opposite last page.

Common Market

From page 26

tainly be no intent to interfere with its conclusion in any way. Many existing provisions of both the U.S. and Canada have become obsolete. Also, in some cases, the Canadian chemical industry may need short-term protection against the competitive cost advantage possessed by the U.S. chemical industry.

The argument that, because so much time is required we should postpone action, is not valid. Formation of a study group now would give the industry of the two countries a head start on eventual consideration of the question by the governments. It is quite likely that the recommendations of such a group would carry considerable weight with governmental study groups at a later time.

Specifically, the group could try to determine what tariffs affecting chemicals could be lowered or eliminated, with advantage to both countries. It could also look at the various classifications of chemicals in both countries to see if more uniformity is possible. At the same time a realistic look might be taken at the tariffs applied to chemical and pharmaceutical products imported into the two nations to the detriment of domestic producers.

The existence of such a study group would also provide an immediately available forum. Here, combined actions could be decided, upon the basis of mutual interest.

There are other important benefits to be derived by the two chemical industries. For such a project would inevitably result in the increased knowledge and understanding of each others' problems and opportunities. We can never have too much knowledge and understanding of that kind.

CORRECTION

In the article, "Will Delaney Clause Make Food Safer?," which begins on p. 28 of the March 1960 CP, it was not correctly noted that Dr. Henry F. Smyth, Jr. of Union Carbide Corporation and Mellon Institute is a holder of a Ph.D. Degree.

Piston Rings and Packing Made of Modified Teflon Cut Maintenance Costs

Also result in decreased downtime, labor savings, increased production and reduction in oil carryover

FRANK E. SUMNER
Assistant Chief Engineer
Sun Oil Company
Marcus Hook, Pennsylvania
with **CP STAFF**

Problem: The Marcus Hook Refinery of Sun Oil Company had a two-fold problem with compressors, 1) to reduce costly piston ring and rod packing failures and 2) to decrease oil carryover into process equipment.

Piston Ring Failures

Maximum expected life of metal rings in three ammonia plant compressors was 7200 hours. Some failed after 3200 hours of service and others at 4000 hours and 6200 hours. Metal rod packings in these same compressors were also not performing satisfactorily.

Operating conditions for ammonia plant compressors are shown in accompanying illustration. Each unit is gas driven and has a rating of 2874 bhp. All cylinders are fitted with cast iron liners, hone finished with the hardness of 196 Brinell.

At first, cause of compressor ring failures was thought to be inadequate lubrication. As failures continued, it became evident that lubrication was not the reason. Jacket cooling water, cylinder liner material, piston construction and piston ring materials were investigated.

Final concensus on reason for failures was improper mating of piston ring to liner materials. Metal piston rings would wear to a feather edge and act as oil scrapers, removing the oil from cylinder wall. Occasionally a failure would result in liner, piston rod and ring renewal. During the investigation period an inspection program was set up to forestall costly failures and develop information leading to their elimination.

Oil Carryover

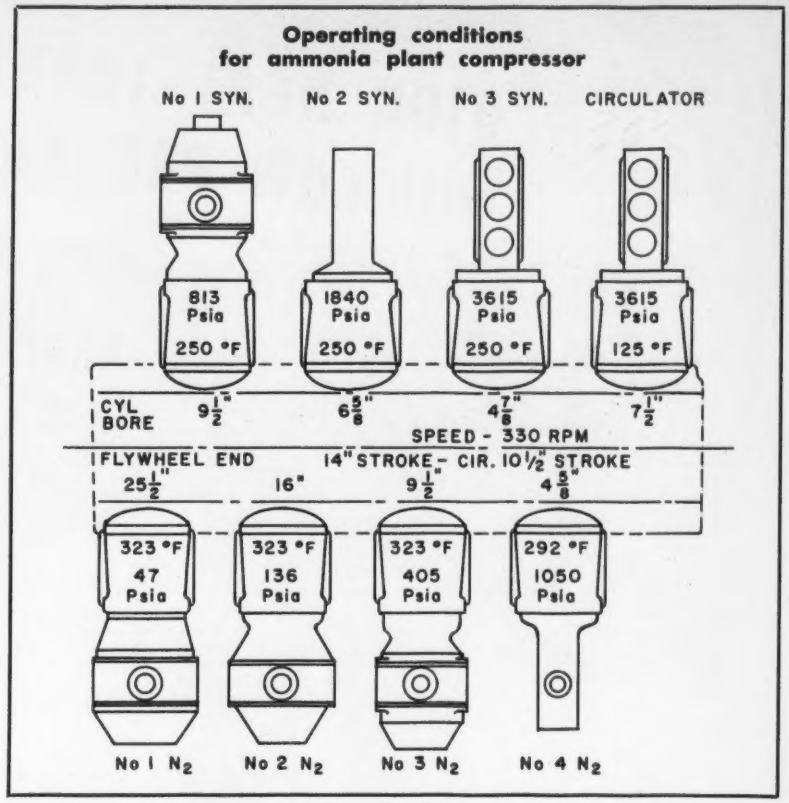
Piston ring failures in ethylene compressors for ammonia plant not only caused high maintenance but permitted excess oil carryover. This made efficient operation of plant difficult.

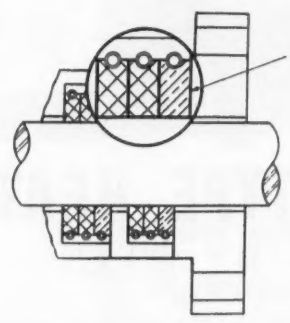
Ethylene compressors are two-stage machines. Size is 15 x 8 x 12 and speed is 400 rpm. Suction conditions are 6.6 psi at −10°F. Discharge conditions are 421 psi at 300°F.

Problem was most prevalent during plant shutdown and startup. Oil blocks in system made safing difficult during shutdown periods and curtailed production during startup. Although system contained an oil-separation unit, it was inadequate for amount of oil carryover. Each time oil was drained off a certain amount of ethylene was lost.

Solution: Since reduced cross-section of piston rings appeared to be a principal cause of failures, non-metallic rings were considered to be best for replacement. Selection of Carbon Bakelite® piston rings was easy to make because of field-proven results. These rings, which were made of asbestos-laminated phenolic resins compounded with graphite, were not applicable to the higher pressures, however. Hence, another material had to be selected.

Teflon® TFE-fluorocarbon resin was chosen as a piston ring material on information obtained from technical data and laboratory tests. However, its reaction to the inherent





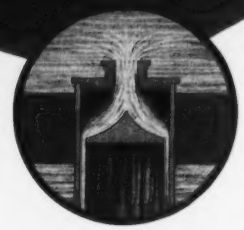
Bronze backup ring dissipates heat and prevents extrusion of glass-filled Teflon-packing used in ethylene compressors

LOW HIGH HEAT TRANSFER RATE with LOW PRESSURE DROP

Vogt

Another Engineering Achievement

*One of the many distributor types developed for various applications.**



**Covered by Pat Nos. 2,057,597, 2,424,441 and others pending.*

TOP: *Muddy well water is the coolant for these Jacket Water Coolers.*

RIGHT: *Two 56" Dia. x 12'0" high Amine Solution Coolers with expansion joints in shell.*

BOTTOM: *One of a number of seawater cycle units for a chemical plant. Nylon distributing ferrules prevent adherence of barnacles. Low pressure drop allows circulation of large quantity of seawater.*

Special metering distributors control the flow in vertical Vogt film type exchangers of single tube-pass design. The liquid is spread in a uniform film over the inside surface of the tubes. Since the liquid falls by gravity, good velocity is obtained with a small quantity of liquid.

Vogt has developed many types of distributors which are made from a variety of materials to accommodate the fluids circulated through the tubes in specific processing operations.

A unique feature of these exchangers is that the tube side can be cleaned while in operation.

Vogt Film Type Exchangers are used as Coolers, Condensers, Absorbers, Heaters, and Evaporators.

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Vogt FILM-TYPE HEAT EXCHANGERS

Check 1971 opposite last page.

characteristics of cold flow and thermal conductivity were not definite. Test results of various modifiers indicated that these characteristics were changed sufficiently for piston ring and rod packing applications. Three types of modified Teflon were selected—graphite, ceramic and glass.

Piston Ring Installations

Graphite-modified piston rings of Teflon were tried in No. 3 synthesis gas cylinder of compressors. Although all installations were not this successful, in one case in which cast iron expanders were used, inspection after 10,194 hours of service showed the following: One ring out of eight was chipped on the edge. Total wear was 0.004". They were returned to service and as of September 1959 had accumulated 14,224 hours of service. Rings are still in operation.

Piston rings of ceramic-modified Teflon were tried in circulator cylinder of compressors, using cast iron expanders. In one case, at 7100 hours of service, one ring was worn thin in spots and replaced. On second inspection at 10,200 hours, rings were found to be in excellent condition and wear rate had decreased considerably. As of September 1959, these rings had accumulated 14,224 hours of service.

Subsequent failures or replacements were due to splitting of Teflon, indicating voids, and breakage from poor dispersion of modifier. Uneven wear was also a cause of failures.

Analyses of failures indicated that original concept for application of modified Teflon was not entirely correct. Original concept was on mechanical features such as side clearances and end gap. Failures, however, indicated that material was not always as uniform as desired. Based on these results, manufacturer of piston rings developed better processing methods and quality control techniques that resulted in an improved product.

In addition, data indicated that wear of piston rings was

To page 102

THAT'S INTERESTING

Declining dollar

Everyone seems to agree that the Yankee dollar is shrinking, but there are many versions as to how much it has shrunk. According to the Chamber of Commerce of the U.S., our dollar is now worth 28.84c. The Chamber says that the dollar hasn't been worth 100 cents since 1900. Since 1940 the drip in buying power has been gradual but steady. Sharpest drop in value occurred from 1910 when it was worth 85.5c to 1920 when it was valued at 42.5c. By early 1930's it had climbed up to 65c.

Translucent ceramic

Ceramic, made from aluminum oxide, is strong, can be pressed into any shape during manufacture and transmits light. Called Lucalox, it was developed by General Electric.

For more information on product at right, specify 1972 see information request blank opposite last page.

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There's a portable, easily adaptable Coppus "Blue Ribbon" Ventilator to fit your specific "fresh-air" requirements. The Coppus "Blue Ribbon" is your assurance of sound workmanship and trouble-free, long lasting operation . . . at reasonable cost. Sales Offices in Thomas' Register. Other "Blue Ribbon" Products in Chemical Engineering Catalog, Refinery Catalog and Best's Safety Directory.

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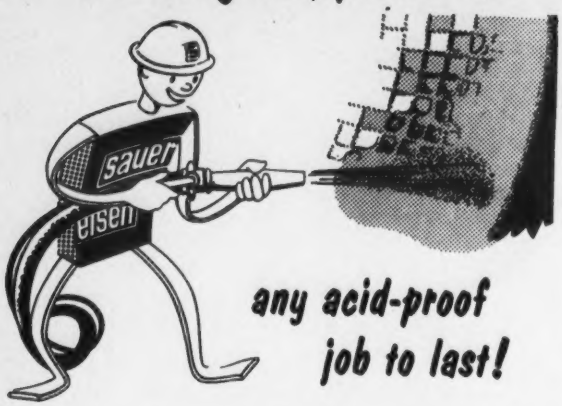


any acid-proof job to last!

Yes, Sauereisen Pour-Lay Cement No. 54, the **Acid-Proof Concrete,** is ready to go to work for you, too . . . for floors, tanks, chimneys. Provides resistance to all corrosive acids (except hydrofluoric) and temperatures as high as 2000°F. Can be gunited, poured, cast in forms or applied as a topping over concrete, brick or tile. Ask for Data Sheets. **Sauereisen Cements Co., Pittsburgh 15, Pa.**

SAUEREISEN POUR-LAY CEMENT **No. 54**
Patent Applied For

Check 1973 opposite last page.

FLEXING?
HEAT?
PRESSURE?

AEROQUIP

Flexible Hose of Teflon
and Reusable "super gem" Fittings*

Whatever your steam problem here's your answer!

When you find heat, pressure or flexing cuts life of ordinary hose, get our bulletin IEB-50— or look in "Yellow Pages" under "Hose" for your Aeroquip Distributor.

*U.S. Patent Nos. 2,833,567 and 2,731,279
**"super gem" is an Aeroquip Trademark
Teflon is DuPont's trade name for its tetrafluoroethylene resin

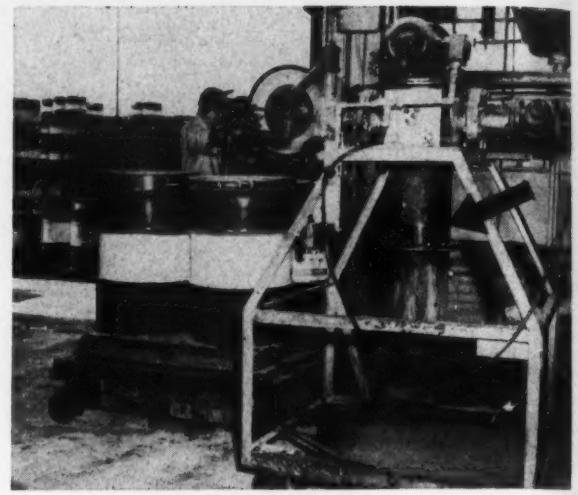
STANDARDIZE ON Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN
INDUSTRIAL DIV., VAN WERT, OHIO · WESTERN DIV., BURBANK, CAL.
AEROQUIP (CANADA) LTD., TORONTO 18, ONTARIO

Check 1974 opposite last page.

NEW SOLUTIONS
of processing problems

Mounted on mobile stand, metal-edge filter (arrow) clarifies liquid phenolic resin before it is sent to 50 gal shipping drums



Doing a tough polishing job at Union Carbide Plastics, efficient metal-edge cartridge . . .

Filters phenolic resins having up to 500,000 cp viscosity

RAPID output of high-purity phenolic resins is being assured through the use of a battery of metal-edge filters at Union Carbide Plastics Company, Division of Union Carbide Corporation. Mounted on mobile stands, the units filter the liquid products prior to their being charged to 50 gal drums or 8000 gal tank cars.

Viscosities vary greatly — ranging from 75 to 500,000 centipoises, depending upon the particular formulation. Temperatures run between 60 and 256°F. Particles anywhere from 0.001 to 0.020" are removed by the metal-edge cartridges. Substances include salts, wood rosin and scale picked up from interiors of processing equipment.

In operation, stationary scraper blades remove contaminants from exterior surface as cartridge turns continuously. Filter elements are removed and cleaned at regular intervals to insure peak perform-

Filter cartridges are cleaned at intervals to insure peak efficiency. Final step in cleaning operation consists of blowing air through unit

Cleaned cartridge being placed back in service

ance and a longer unit life.

Union Carbide supplies the phenolic resins for use in bonding agents for industrial and decorative laminates, thermal insulation, acoustical tile, lacquers and varnishes, sand paper and other abrasive grinding products.

Use of the filters permits plant to operate on semi-continuous basis, mixing different formulations and maintaining precise quality standards for each batch of resin. Without the filters it would be necessary to strip down the distillation unit after each batch to prevent contamination between batches. This would involve considerable downtime and production loss.

Metal-edge filter elements are manufactured by winding a continuous trapezoidal ribbon of type-304 stainless steel into cylindrical form. This ribbon has predetermined, spaced integral risers formed in the metal ribbon. Height of risers accurately space one coil from the other and determine the degree of filtration efficiency. Thus, in these self-cleaning units, the many coils wound about a cylindrical support form a rigid, strong edge-type filter.

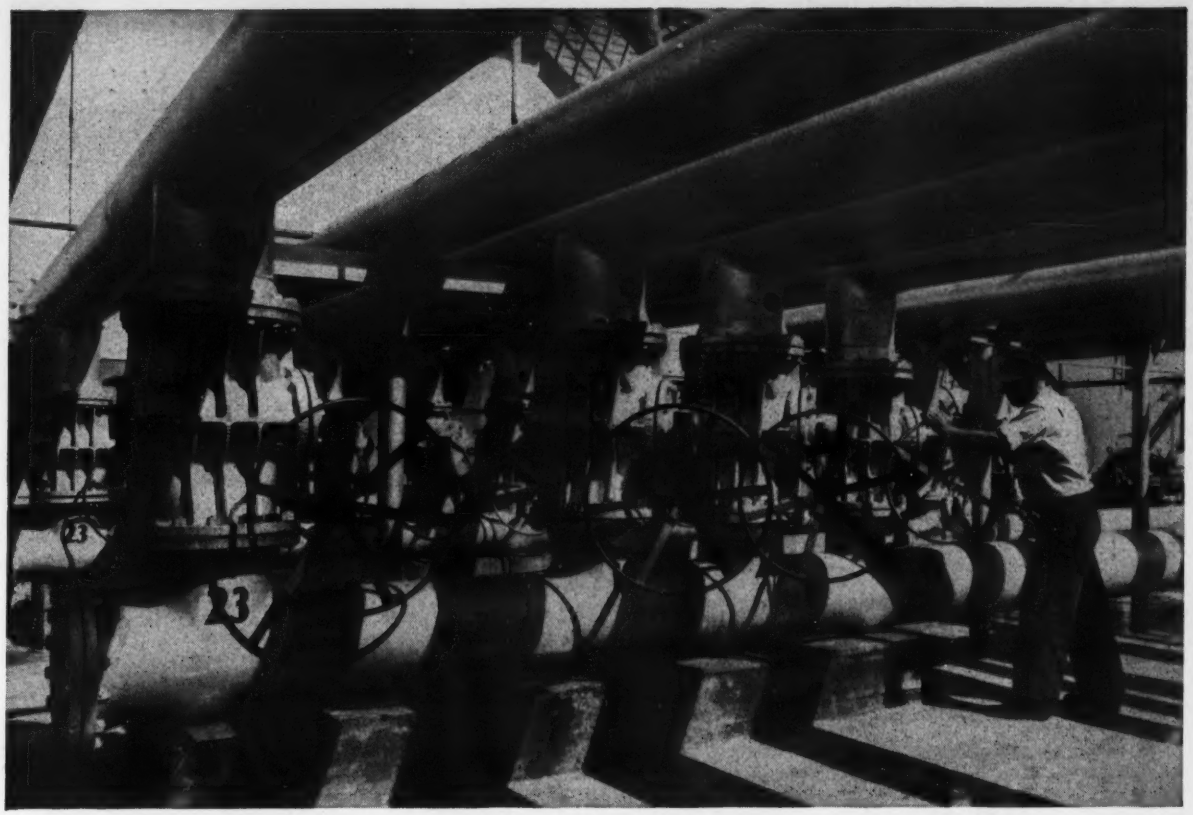
Pores are uniformly equal and free of defects. The elements can be used in filtering applications ranging in temperature from −100 to −300°F.

(Metal-edge filters are product of Purolator Products, Inc., 970 New Brunswick Avenue, Rahway, New Jersey.)

Check 1975 opposite last page.

IN JULY CP

Good community relations can go hand-in-hand with proper waste handling techniques. How Metal and Thermit Corporation went all out to insure this at their Carrollton, Kentucky, organometallics plant is revealed in our July issue's New Solutions Section.

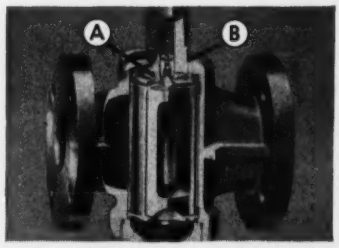


When it comes to quick, efficient control of petroleum products . . .

these Homestead® Lubricated Plug Valves handle 2,000,000 barrels a month!

At the West Coast marine terminal shown above, the tremendous flow of gasolines and oils from storage and tankers demands smooth, positive operation at all times. For this reason, 33 Homestead Lubricated Plug Valves in sizes from 8" to 16" were specified for this installation.

Today more and more oil companies specify Homestead Valves for their dependable, maintenance-free performance and built-in engineering advances. For example, *100% pipe area* reduces ship loading and unloading time. *Pressurized chemical seal* and closely fitted plug and body assure positive shut-off, no mixing of different fluids. *Controlled lubrication* provides full coverage of sealing surfaces without contamination of line fluids. *Quick operation* . . . Homestead Valves are fully opened or closed in a quarter turn of the plug.



Cross-section of Homestead Lubricated Plug Valve. Triple head seal (A) prevents leakage. Tell-tale lubricant ring at (B) signals full system, prevents waste of lubricant and contamination of line fluids.

For complete details and valve recommendations for *your* application, mail coupon below.

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
Coraopolis, Pennsylvania

Homestead Valve Manufacturing Co. 140
P.O. Box 140, Coraopolis, Pa.

Gentlemen:
Please send reference books on Homestead Lubricated Plug Valves and their uses.

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

Check 1976 opposite last page.

Photo shows portable pump unit connected to internal combustion engine by a Type F FALK Steelflex Coupling

How FALK STEELFLEX Couplings give your connected machinery Double Protection

FIRST: *They protect against shaft misalignment.* Some degree of shaft misalignment is unavoidable—and unless protective compensation is provided, additional loads are developed on shafts, bearings and other revolving elements. The result is excessive wear-and-tear—and often actual breakage....FALK Steelflex Couplings compensate for either angular or parallel misalignment—*or for the more serious condition involving both!* The exclusive Steelflex gridmember which joins the two hubs is not fastened to either hub; thus, either hub can shift in any direction without imposing a load on the other hub.

Yet, important as protection against shaft misalignment is to you, it is only one function of the *truly flexible* FALK Steelflex Coupling.

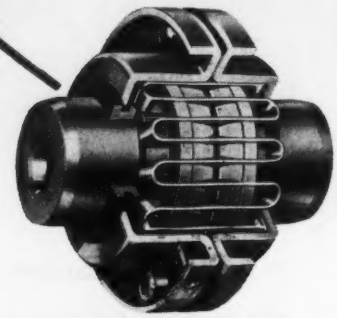
SECOND: *They protect against torque fluctuations* which create excess wear on connected machines and frequently induce destructive shaft misalignment. The exclusive FALK Steelflex grid-groove design cushions shock loads, dampens vibration, reduces impact loads as much as 30 per cent. You get this extra margin of protection that *can mean the difference between operating and breakdown!* You save on maintenance costs. And —you prolong the service life of your machines!...For complete information, ask your FALK Representative or Authorized Distributor. Or—**write direct for Bulletin 4100.**

FALK and STEELFLEX are Registered Trademarks

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

Representatives and Distributors in Most Principal Cities

Manufacturers of Quality Gear Drives and Flexible Shaft Couplings



Basic Type F
FALK STEELFLEX COUPLING fills the needs of 90% of industrial applications

This cutaway view shows the exclusive Steelflex design which provides *torsional resilience with the strength of steel.* This torsional resilience spreads peak or shock loads over a relatively long increment of time, thus *greatly reducing stresses* in connected machinery.

The versatile Type F Steelflex can be used horizontally or vertically, without modification or special parts. It is ideally suited to 9 out of 10 applications. For unusual applications involving overload conditions, extended shafts, brakes, etc., standard designs of dual-purpose Steelflex couplings are available.

For most applications, you can give your machines the extra protection afforded by FALK Steelflex Couplings at no extra cost!

FALK

...a good name in industry

DATA SAVERS!

CP's Processing and Engineering Data Section is for you!

Each month, this section contains time-saving nomographs, tables, or charts which other data savers have found extremely useful in speeding calculations. They have been sent to us by our many readers.

Perhaps, you will find them to be of value to you.

A wide variety of information can be found in this section. So, no matter what your particular field you will find suitable data to aid you in your daily work.

And —

the section pages are designed to fit easily into regular data files.

Keep them handy for use in making quick calculations in the plant or office.

Just cut along the marked edge, punch as indicated, and insert them into your notebook.

So —

be sure not to miss this month's "Data Section." It begins on page 103.

For more information on product at left, specify 1977 see information request blank opposite last page.

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STEEL service

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ESCO LIMITED, VANCOUVER, B. C.
8425 Ontario Street.....ELgin 22

Hot gases scavenged from copper furnace by glass-bag unit

Fabric withstands up to 600°F, cuts cooling needs

Dust collection costs for metallurgical furnaces can be cut considerably by the use of glass cloth filters. A big 120-compartment unit installed for the past two years on a copper smelting reverberatory furnace at Hudson Bay Mining and Smelting Company, Ltd., Flin Flon, Manitoba, has proven that the bags can satisfactorily withstand the tough service conditions.

Big stumbling block in the past for fabric filters has been low temperature limitations. High cost of cooling tubes and other devices necessary to reduce gas temperatures made bag-type installations extremely expensive.

The 600°F capability of the glass bags permit smaller cooling facilities which reportedly can cut as much as 50% off initial installation costs. Another important advantage of the glass media is that it resists corrosive attack of acids in the furnace exhaust gases.

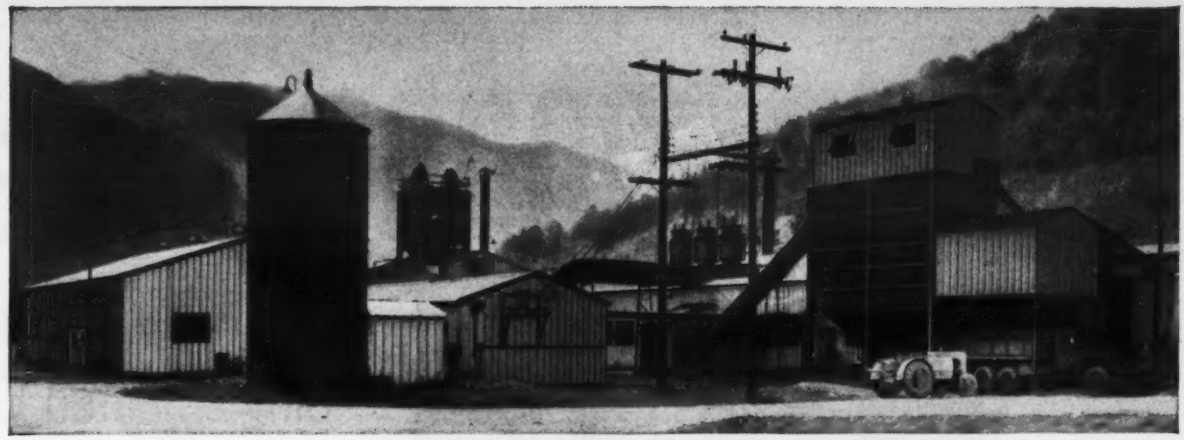
The system at Hudson Bay handles 450,000 cfm. Installation consists of 154 bags per compartment for a sum of 18,480 bags. Total bag area is 221,760 sq ft.

Gases at 800°F are blown from an electrostatic precipitator to a series of cooling tubes where temperature is dropped to 450-550°F before being sent to the glass bag filters. Bags are automatically cleaned by a system that imparts oscillating motion to top of bags. Gentle handling assures maximum service life. Air-operated valves admit reverse-jet cleaning air.

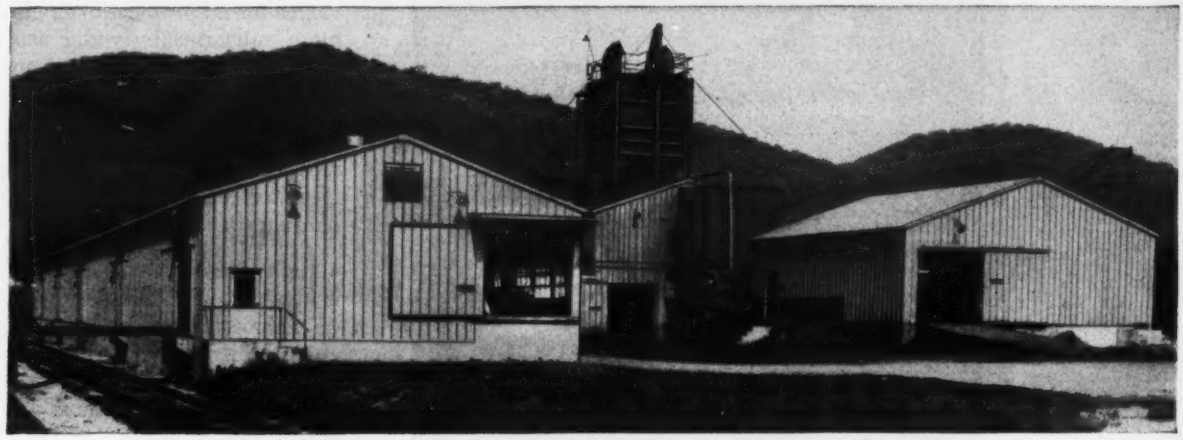
Daily collection is in excess of 35 tons. Collected dust is returned to process for metal recovery.

(Further information about glass bag filters may be obtained from Dracco Division of Fuller Company, Harvard Avenue & East 116th Street, Cleveland 5, Ohio.)

Check 1978 opposite last page.



Butler buildings at Charcoal City • Storage Building • Transfer Shed • Power House • Tractor Garage (2) • Processing and Packaging • Pump House • Unloading • Equipment Repair • Office • Elec. Sub-Station • Head Houses (2) • Conveyor Shelter



"CHARCOAL CITY"...

a village of **Butler Buildings**

The folks around Parsons, West Virginia, have come to think of the Kingsford Chemical Company's plant as Charcoal City. Here, nestled in the hills of West Virginia, is a large, completely self-contained manufacturing facility for producing charcoal briquettes.

And every structure in Charcoal City, from the office to the pump house—including processing and warehousing facilities—is a pre-engineered Butler building.

Why Butler? The answer is simple. First of all, with Butler you're not limited to a few standard size buildings. You can choose from a wide selection of pre-engineered components and build as large or as small as you wish. Then, there's Butler quality. Precision fabricated Butler components fit together perfectly. Your completed building is neat, structurally sound, and completely weathertight. Interiors are spacious, free of columns and overhead trusses. Your Butler building gives you more usable space for your construction dollar. And, of course, there are the inherent advantages of all-metal construction: standardization, fire safety, favorable insurance rates, low maintenance costs, and fast, economical expansion.

If you're planning to expand existing facilities, or build a completely new plant, get the full story on Butler buildings today. Call your nearby Butler Builder. Ask about Butler financing, too. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Or write direct.

BUTLER

BUTLER MANUFACTURING COMPANY 7473 East 13th Street, Kansas City 26, Missouri

Manufacturers of Metal Buildings • Equipment for Farming, Oil Transportation, Outdoor Advertising • Contract Manufacturing

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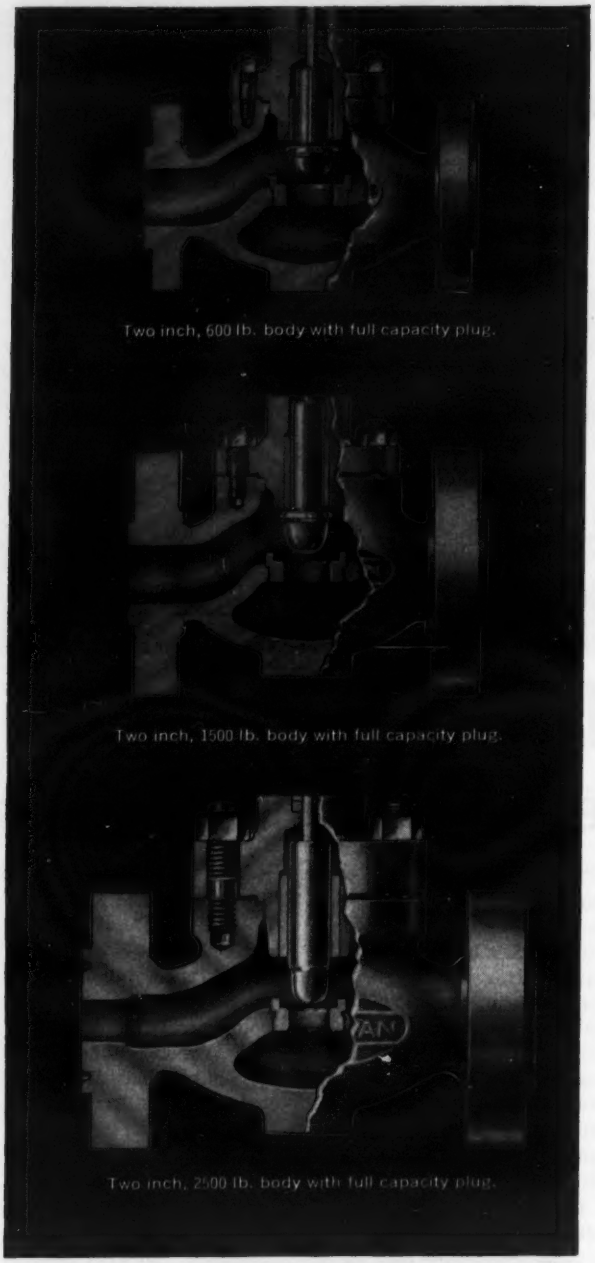
Check 1979 opposite last page.

Masoneilan 20000 Series Control Valves



Two inch, 600 lb. body with full capacity plug.

Two inch, 1500 lb. body with full capacity plug.

Two inch, 2500 lb. body with full capacity plug.

The Most Versatile Single Seated Valves Available

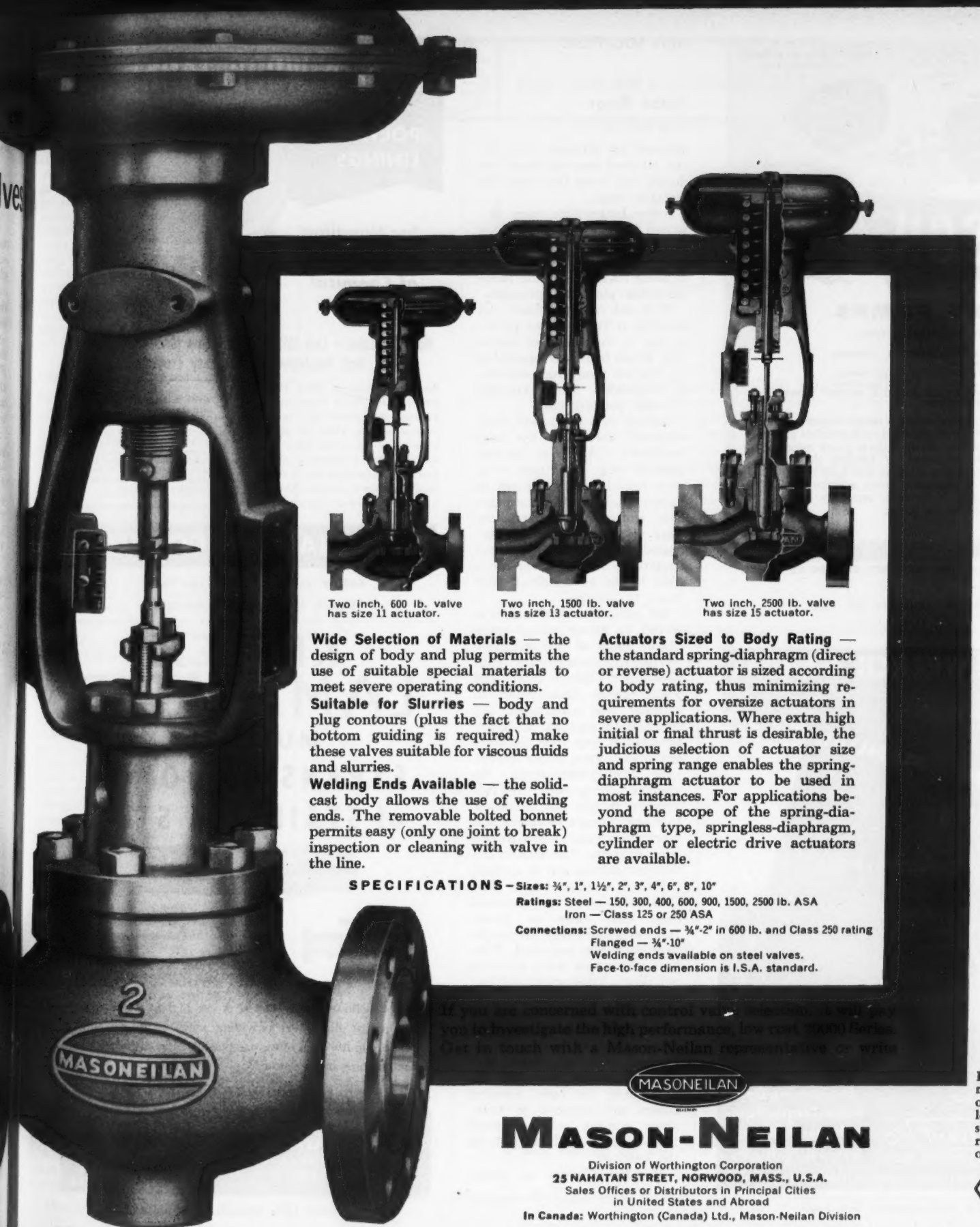
With the introduction of this new line of solid-cast control valves the advantages of single seat design become available for a substantially wider scope of application, from the simple to the most severe. Consider these premium features built in as standard, available to you at no extra cost.

• **High Capacity** — top guiding, unrestricted seat ring area, body and plug contours provide greater capacity than most top-and-bottom-guided double seated valves of comparable sizes.

• **High Pressures and Pressure Drops** — high capacity is attained with minimum seat ring areas, resulting in less unbalance force, permitting higher pressure drops. Heavy guiding throughout full stroke results in a minimum of unsupported plug length and allows high pressure and high pressure drop applications without lateral vibration. Generous guide surfaces and large plug stems are sized in accordance with body rating.

• **Wide Selection of Reduced Capacity Trim** — for those applications where velocity due to high drop is a consideration (or where future requirements for larger capacity are a factor) a wide selection of reduced capacity trim is available — and interchangeable in comparable valve sizes and ratings (see table). The proper relationship between stroke and trim size is maintained in order to provide the strongest possible plug tip, particularly in hard, brittle materials.

Valve Size	Available Cv Ratings										
¾	1.5	3.4	5.2	8							
1	1.5	3.4	5.2	12							
1½	1.5	3.4	5.2	12	25						
2	1.5	3.4	5.2	12	25	46					
3				12	25	46	110				
4					25	46	110	195			
6						46	110	195	400		
8							110	195	400	640	
10								195	400	640	1000



Two inch, 600 lb. valve has size 11 actuator.

Two inch, 1500 lb. valve has size 13 actuator.

Two inch, 2500 lb. valve has size 15 actuator.

Wide Selection of Materials — the design of body and plug permits the use of suitable special materials to meet severe operating conditions.

Suitable for Slurries — body and plug contours (plus the fact that no bottom guiding is required) make these valves suitable for viscous fluids and slurries.

Welding Ends Available — the solid-cast body allows the use of welding ends. The removable bolted bonnet permits easy (only one joint to break) inspection or cleaning with valve in the line.

Actuators Sized to Body Rating — the standard spring-diaphragm (direct or reverse) actuator is sized according to body rating, thus minimizing requirements for oversize actuators in severe applications. Where extra high initial or final thrust is desirable, the judicious selection of actuator size and spring range enables the spring-diaphragm actuator to be used in most instances. For applications beyond the scope of the spring-diaphragm type, springless-diaphragm, cylinder or electric drive actuators are available.

SPECIFICATIONS — **Sizes:** ¾", 1", 1½", 2", 3", 4", 6", 8", 10"
Ratings: Steel — 150, 300, 400, 600, 900, 1500, 2500 lb. ASA
Iron — Class 125 or 250 ASA
Connections: Screwed ends — ¾"-2" in 600 lb. and Class 250 rating
Flanged — ¾"-10"
Welding ends available on steel valves.
Face-to-face dimension is I.S.A. standard.

If you are concerned with control valve selection, it will pay you to investigate the high performance, low cost 30000 Series. Get in touch with a Mason-Neilan representative or write

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MNO-1

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METERING PUMPS

- COMPLETELY SANITARY, STAINLESS STEEL CONSTRUCTION.
- POSITIVE DISPLACEMENT—SMOOTH, UNIFORM, NON-PULSATING FLOW.
- PUMP HEADS DEMOUNTABLE WITHOUT TOOLS . . . FOR INSPECTION, CLEANING AND STERILIZING.
- DISPENSE BOILING-HOT OR ICE-COLD WATERY LIQUIDS OR HIGHLY VISCOUS FLUIDS.

Maisch Metering Pumps are simple in design, ruggedly built for long service, and can be depended on to maintain accuracy indefinitely. Exclusive design features insure optimum performance. Particularly suited for handling chemicals, syrups, oils, glue, processing solutions, etc. Quick demountable or fixed heads. Fixed capacity pumps available in wide range of output. Pumps in stock for immediate delivery. Write for complete details and prices.

mechanical mp products

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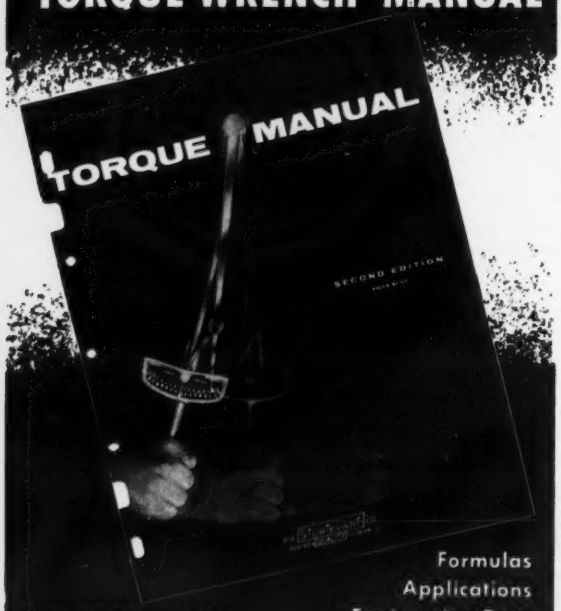
Check 1981 opposite last page.

"TORQUE WRENCH" MANUAL



SENT UPON REQUEST

Formulas
Applications
Engineering Data
Screw Torque Data
Adapter Problems
General Principles

PA STURTEVANT CO
ADDISON QUALITY ILLINOIS

Manufacturers of over 85% of the torque wrenches used in industry

Check 1982 opposite last page.

NEW SOLUTIONS

Piston Rings

From page 94

affected by oil-feed rate. So far, oil-feed rate has been reduced 75% from that used for metallic rings.

After longer life was obtained with piston rings made of modified Teflon, decision was made to try rod packing of same material for the three ammonia plant compressors.

First set of glass-filled rod packing of Teflon failed quickly due to instability of material. When heat was generated by friction along rod, material expanded and extruded through packing cups.

Second set was made from material stabilized by heat treatment. Also, a bronze backup ring was used with each set of modified rings of Teflon. Backup ring dissipates heat and prevents extrusion. This set of packing has operated successfully since installation. As of September 1959, it had accumulated 7224 hours of service.

Oil carryover problem was solved by fitting second-stage piston rings of one ethylene refrigeration compressor with glass-filled Teflon rider and piston rings. Lubrication to cylinder was eliminated but retained to packing. Cylinder lubrication was then dependent upon vapor phase carryover from first stage. By altering compressor in this manner, it was not necessary to make changes to valves and lubrication was eliminated from cylinder that was in direct communication to system.

First inspection made after 7000 hours of service revealed high wear rates on piston rings and more lube oil carryover than was expected. Further alterations were made to cut down lubrication and reduce ring wear.

Packing was changed to glass-filled Teflon and first stage rings were changed to Carbon Bakelite. With this change, lubrication will be eliminated to both packing boxes and reduced to first-stage pistons so that total lube-oil feed will be 15% of the original.

Results: Change to piston

To page 104

modern WOOD TANKS WITH POLYMER LININGS

for Handling and Storage of Chemical Solutions

Non-Corrosive • Low Initial Cost • Low Maintenance Cost
High Insulation Value • Easy Erection

The introduction of NEW POLYMER LININGS for Wood Tanks has made possible the "POLYCEL" tank — for practically any chemical solution — covering a pH range from zero to fourteen. The combination of a low cost wood membrane and a variety of tough, resistant polymer films offers big advantages over high priced alloys.

Write today for up-to-the-minute information on "Polycel."

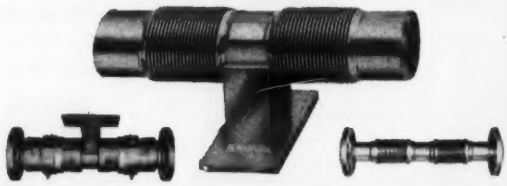
Also available, new factual tank industry bulletins on comparative costs, maintenance, chart of chemicals and effects, and thermal qualities. Ask for NWTI bulletins 1 through 5.

WENDNAGEL & CO., INC.

608 W. Cermak Rd., Chicago 16, Ill.

Check 1983 opposite last page.

KEFLEX LAMINATED
MULTI-PLY
EXPANSION JOINTS
of STAINLESS STEEL



for Power and Process Piping

Keflex bellows are laminated of the highest quality and uniformity alloy steel providing much more flexibility and cyclic life than otherwise possible. For high and low temperature and pressure.

Write for Catalog on Complete Line.

KEFLEX MANUFACTURING DIVISION
of U. S. FLEXIBLE METALLIC TUBING CO.
HEAD OFFICE - 63 MAIN ST., SAN FRANCISCO
FACTORY - LOS ANGELES, CALIF.

Check 1984 opposite last page.

PROCESS PIPING POINTERS

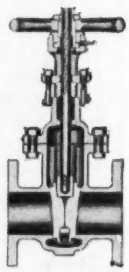
200-pound bronze valves have increased body strength; maintenance is simplified

Cylindrical body shape such as used for steel valves gives these bronze gates increased resistance to external strain, and prevents internal stress concentration. It eliminates pinched effect on body; provides huskier, wider hex ends for firmer wrench grip. Seat rings are Crane Exelloy, rolled in. Easily replaceable bronze disc takes all seating wear. Sizes ¼ to 3 in. Get Circular AD-2285. See below.

"Aids to Selection of Corrosion-Resistant Piping Materials"

You will combat corrosion more effectively with this 12-page technical paper at hand. It discusses questions on important related service factors that are not always evident; shows with colored "Stop, Caution and Go" charts the suitability of metals for more than 150 corrosive fluids, based on extensive tests and experience. Ask for Bulletin AD-1703R. See below.

High-nickel/high-chrome stainless valves ideal for sulphuric acid



On sulphuric acid at elevated temperatures and in a wide range of concentrations, these specially developed "Craneloy 20" valves are giving highly improved service over other stainless alloys. Gate, globe, angle and check patterns are available. Gate valves feature exclusive split-wedge disc with free-to-rotate design that insures tight closure and prevents seizing and galling at seats. Ask for Circular AD-2411.

For literature or data on product listed above, please contact R. E. Catlett, Manager, Chemical Sales Dept. No obligation.

CRANE

CRANE CO. Industrial Products Corp.
4100 South Kedzie Ave., Chicago 32, Illinois
VALVES • ELECTRONIC CONTROLS • PIPING
PLUMBING • HEATING • AIR CONDITIONING

Check 1985 opposite last page.

MAY 1960

CUT HERE AND FILE

Length of Paper in a Roll

S. E. HENRY
Crossett, Arkansas

Accompanying nomograph will help to determine length of paper in a roll when caliper, roll diameter, and core diameter are known. It can prove useful when dealing with paper and paper board where differing core sizes are used. Nomograph is based on following equation:

$$L = \frac{65.45\,(D^2 - d^2)}{C}$$

where: L = Length of roll, ft
C = Caliper, mils
d = Diam of core, in
D = Diam of roll, in

Typical Example

Find length of paper in roll having core diameter of 4″ and outside diameter of 40″, with caliper of 6 mils. Connect 40″ on D-scale with 4″ on d-scale. Note where this line intersects R-axis. Extend line from this point through 6 mils on C-scale until it crosses L-scale. Length of paper in this roll is 17,300′ or 5760 yd.

nomograph on page 105

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SPECIAL INSULATION PROBLEMS?

WRAP 'EM UP FAST!

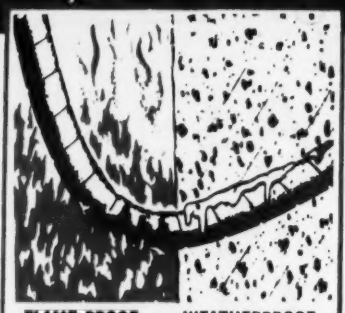
tops for personnel protection and instrument line insulation

You save with Insutape when you have instrument lines that need quick, low cost, effective insulating or wherever close clearances make ordinary insulations difficult to apply.

Insutape also contributes substantial savings where insulation is to be removed and reapplied. Withstands the ravages of intense heat or vibration.

This insulation of a thousand uses is made of long-fibered asbestos rovings, completely enclosed in a tubular woven asbestos jacket, furnished either plain or with Neoprene-impregnated weatherproof jacket. It's tough, resistant to abrasion, moisture, oil and grease... quick and easy to apply. YOU CAN DO IT FASTER WITH INSUTAPE!

Write today for complete information and engineering data



FLAME PROOF **WEATHERPROOF**

Insutape's woven asbestos jacket, heavily coated with Neoprene makes it a rugged pipe protector and a highly efficient insulation even under extreme conditions. A snug fit that will properly weatherproof instrument lines and also provide personnel protection. Quick, tight, easy application.

INSUTAPE

The wrap-on insulation of a thousand uses

UNARCO

UNARCO PRODUCTS

• UNIBESTOS, Amosite Asbestos Pipe Covering and Block • Calcium Silicate Pipe Covering and Block • 85% Magnesia Pipe Covering and Block • Mineral Fiber Block • Wrap-On Insulation • Lace-On Insulation • Turbine Blankets • Insulating and Finishing Cements • Asbestos Textiles • Packing and Gasketing.

UNION ASBESTOS AND RUBBER COMPANY • FIBROUS PRODUCTS DIVISION
DEPT. 203, Bloomington, Illinois

Check 1986 opposite last page.

NEW SOLUTIONS

Piston Rings

From page 102

rings and rod packing of modified Teflon and Carbon Bakelite has reduced maintenance cost 73% for first year of operation. Modified Teflon has contributed 30% to this reduction. As more operating hours accumulate and as more rings and packing are replaced with the modified Teflon, maintenance savings will be still greater.

Not one Teflon failure has resulted in change of cylinder liners, pistons or rods. This provides direct savings in downtime, inventory, manpower and production. It also increases reliability of equipment. During peak plant production, availability factor for both engines and compressors has been 99%. Emergency shutdowns have been practically eliminated, decreasing confusion and breakdown of communications and improving human relations.

Reduced oil carryover has decreased labor requirements and increased production. Labor costs during safing of ethylene unit were lowered by 66%. Production losses were cut 33% during the first three days of startup.

(Flur-O-Fran modified piston rings and packing Teflon and Carbon Bakelite rings are products of France Packing Company, 9925 Bustleton Ave., Philadelphia 15, Pa.)

Check 1987 opposite last page.

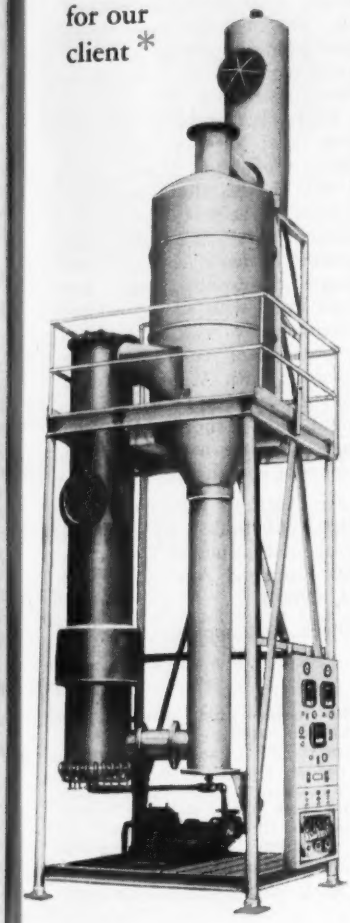
(For further information on Teflon TFE-fluorocarbon resin contact E. I. du Pont de Nemours & Company, Inc., Polychemicals Department, Wilmington 98, Del.)

Check 1988 opposite last page.

(Author acknowledges with thanks the technical assistance on the use and application of modified Teflon by following: R. E. Hunt and J. V. Mailey of France Packing Company; and F. M. Chapman and L. H. Gillespie of E. I. du Pont de Nemours & Company, Inc. Special recognition should be given to Harold E. Lawton, II of Sun Oil Company for his aid in article preparation.)

this EVAPORATOR

was custom-engineered to do a specific job for our client *



*Our clients tell us how they want their products. We design, build, and deliver the equipment to do the job!

CUT HERE AND FILE

THERMOVAC will custom-engineer and fabricate the processing equipment best for your job!

• Evaporators • Heat Exchangers • Process Automation • Rotary Coil and Steam Jacketed Kettles • Specialized equipment for the Food and Chemical Industries.

Write or call for immediate service; expert consultation!

Thermovac *inc.*

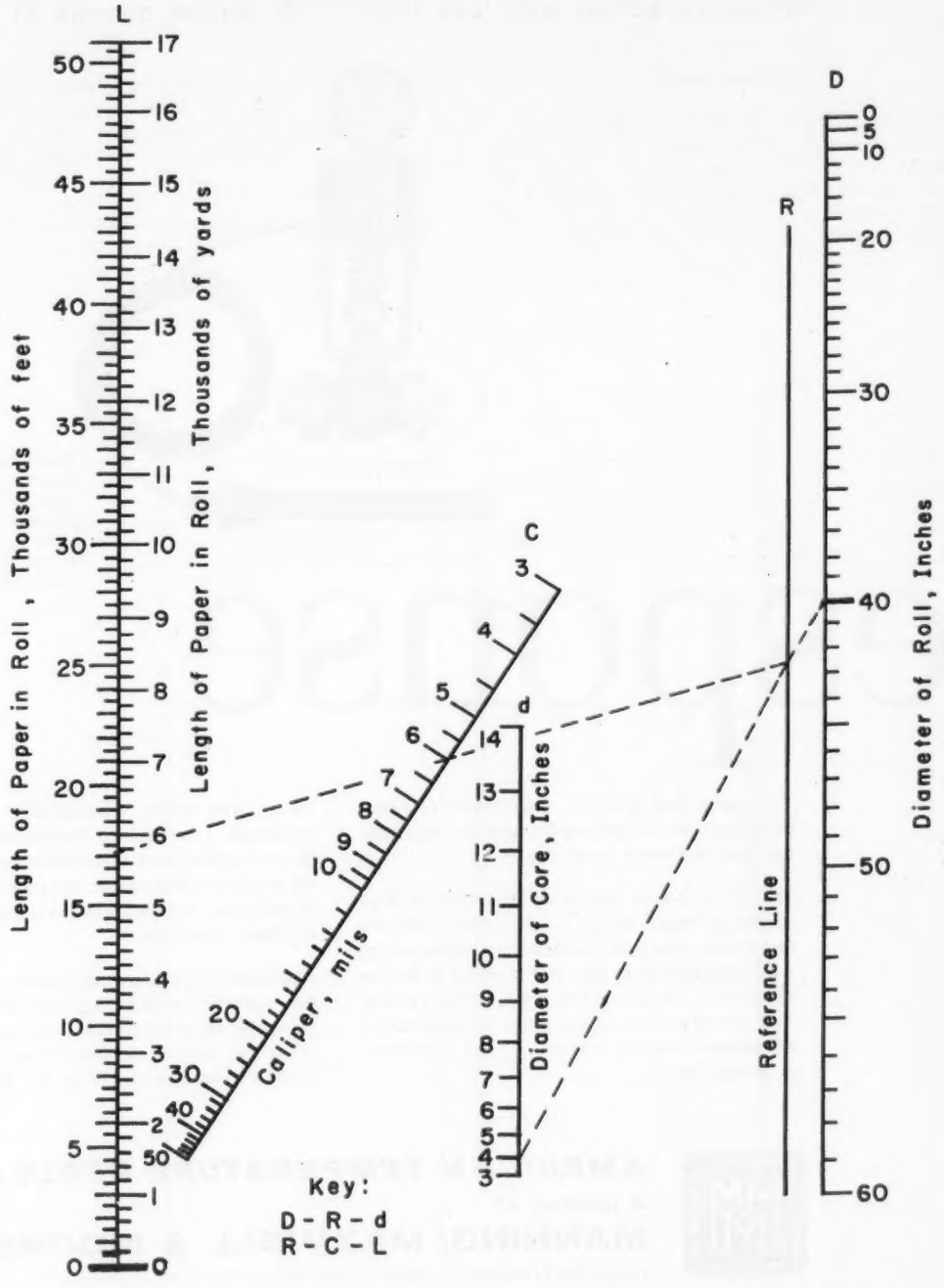
A SUBSIDIARY OF RHEEM MANUFACTURING CO.

816 East Hazelton Avenue
P.O. Box 209
Stockton, California

Check 1989 opposite last page.

Length of Paper in a Roll

From page 103



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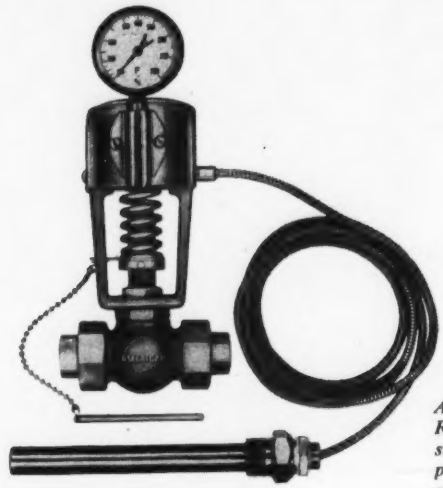
immediate

AMERICAN TEMPERATURE REGULATORS begin corrective action with less than 1/10 degree change at the bulb



American Temperature Regulators are made in sizes ½" to 4". Temperature ranges as low as minus 15° F. to 50° F.—as high as 240° F. to 350° F.

response

You get fastest possible temperature response from these new regulators because the stem cannot bind and retard valve action.

The valve stem on American Temperature Regulators is sealed off by a friction-free bellows that makes practical a nonleaking packless valve. Also contributing to fast, stable action is the use of an extra-long preflexed adjusting spring. This spring permits a long range of temperature adjustment without disturbing valve sensitivity at normal levels.

There are other high-quality features in American Temperature Regulators: maximum use of stainless steel; standardized parts; the fewest possible components; and unitized assembly. In addition, compactness simplifies installation in "tight" locations.

Accurate temperature regulation and attention-free operation mean long-term economy. Your industrial supply distributor will gladly help you select the right American Temperature Regulators for your needs. Write for Bulletin 114A.

MAXWELL MANNING M&M & MOORE TRADE MARK

AMERICAN TEMPERATURE REGULATORS

A product of

MANNING, MAXWELL & MOORE, INC.

Gauge and Instrument Division • Stratford, Connecticut
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Check 1990 opposite last page.

NEW SOLUTIONS

Neoprene-lined tanks handle 20% H_2SO_4 for three years

No maintenance or repairs of any kind has been required on two neoprene-lined tanks used continuously in 20% sulfuric acid at 180°F for more than three years.

Each tank is 14½′ long, 13′ wide and 9′ deep. Inside of each tank was lined with 3/16″ of 722 sheet neoprene rubber — selected for its resistance to chemicals, oil, grease, abrasion, cracking and ozone degration. Inside was then lined with acid-proof refractories.

Outside of each tank was covered with ⅛″ more of a mastic compound before shipment and ⅛″ more of the same material after arrival at plant where it was installed.

(For further information on lining of tanks contact Heil Process Equipment Corp., 12-901 Elmwood Ave., Cleveland 11, Ohio.)

Check 1991 opposite last page.

How sealless pump speeded liquid chlorine loading 140% is told in reprint of case-history article. Product, at −10°F, is transferred from 50 ton tanks into cylinders and tank cars. Reprint "Speeds Liquid Chlorine Loading" — Chempump Division, Fostoria Corporation.

Check 1992 opposite last page.

Case history report tells how alumina granules are dryed in two conical-bottom spray dryers. Having 24 x 32 ft drying chambers, total capacity of the two units is up to 8000 lb per hr. Reprint SP — Bowen Engineering Inc.

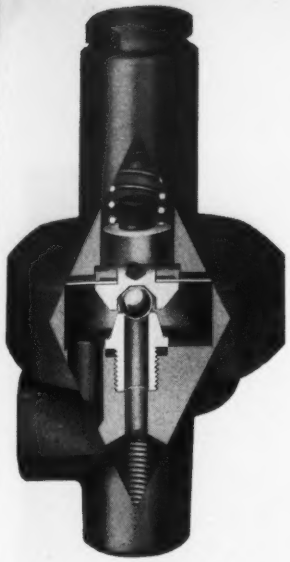
Check 1993 opposite last page.

Solvent extraction and how it is conducted in a uranium mill with a compact mixer-settler unit, is reported in illustrated bulletin. Both plan and profile views of the equipment are shown. M7-F65 — Denver Equipment Co.

Check 1994 opposite last page.

Vacuum system installations in various industries are pictured and described in six-page report. Vacuum Report No. 3 — Kinney Vacuum Division, The New York Air Brake Company.

Check 1995 opposite last page.



THIS PREMIUM RELIEF VALVE PROVIDES ABSOLUTE SAFETY IN CORROSIVE SERVICE

- The Milton Roy full-lift design assures immediate and positive relief when the set pressure is reached, yet there's no chattering or leakage as the relief valve approaches its set pressure.
- Continued leak-free operation is assured even after the valve has opened in corrosive service, because topworks are completely isolated from the process stream by a Teflon diaphragm.
- Wetted parts are available in steel, 316 stainless, Carpenter 20 stainless, Hastelloy "C" or "B", or PVC. Sizes range from ¼" up for pressures to 1500 psi. Back pressure valves are also available.

For complete information, request Bulletin 357-2 from Milton Roy Co., 1300 East Mermaid Lane, Philadelphia 18, Pennsylvania.

milton Roy
CHEMICAL INSTRUMENTATION SYSTEMS

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 1996 opposite last page.

CUT HERE AND FILE

Higher Heating Value of Coal

S. E. HENRY
Crossett, Arkansas

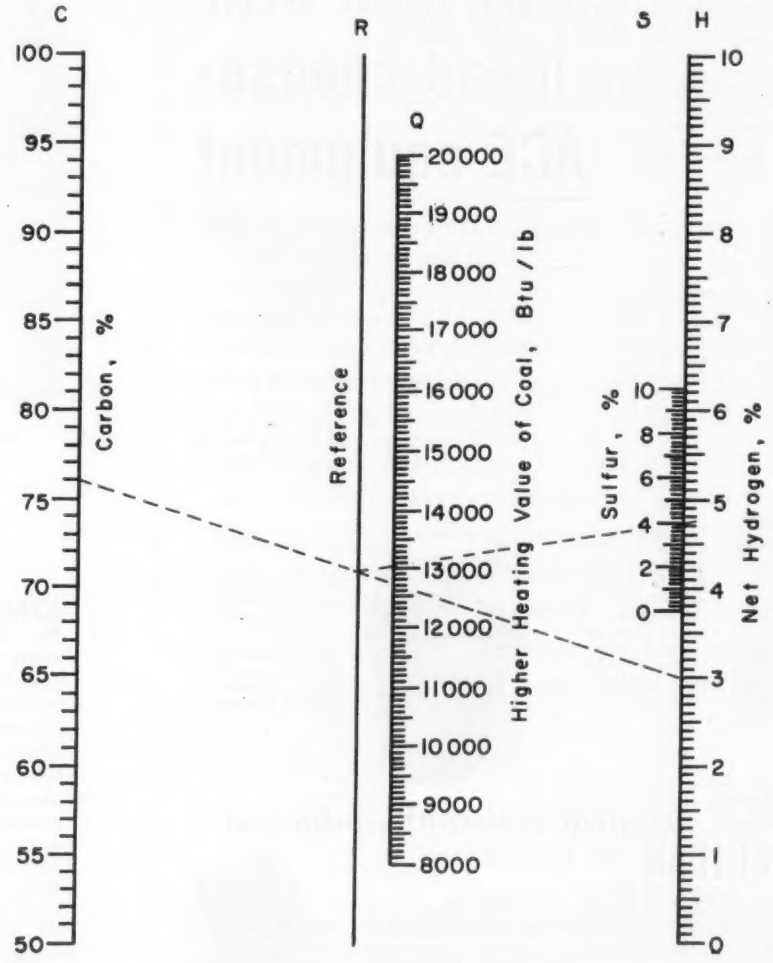
This nomograph enables one to estimate higher heating value of coal from heating values and percentages of principal components, by means of a variant of the Dulong formula:

$$Q = 145\ C + 620\ H + 40.5\ S$$

where Q is higher heating value in Btu/lb of oven-dry coal, and C, H, and S are percentages of carbon, net hydrogen and sulfur, respectively.

Typical Example

What is higher heating value of coal when percentages of carbon, net hydrogen and sulfur are 76, 3 and 4, respectively? Connect 76 on C-scale and 3 on H-scale with straight line. Note intersection with R-axis. Connect this point with 4 on S-scale and read desired higher heating value on Q-scale as 13,000 Btu/lb of oven-dry coal.



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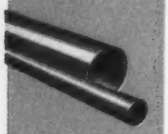
Life in these excited states...

"Glad to see you're a man with ideas, Henry"

Why men with ideas choose ACE equipment

Leading chemical design and development men work in the future... with no time to go back over specifications for equipment that didn't work out. You'll find they reach for Ace corrosion-engineered equipment time and again...just to be *sure*. If equipment failures give *you* no time to think ahead, it's time to give us a call.

ACE-ITE all-purpose toughie



High-impact, rubber-plastic, most economical for average chemicals. ½ to 6". Screw or solvent welded fittings. Valves ½ to 2". NSF-approved. *Bul. 80A.*

ODD SHAPES? you make...we line

Rubber or plastic lining is economical life insurance for costly "special" equipment. It's a specialty with ACE. Write for *Bul. CE-53.*

PLASTIC VALVES for matched systems

Choice of Riviclor PVC, Ace-Ite rubber-plastic, Ace polyethylene or Ace Saran to match *any* plastic pipe. Sizes ½ to 2". Also larger plastic-lined valves.

Ace-Hide, tough as a rhinoceros, insensitive to corrosives, makes this finest of acid pails. Also dippers, bottles, funnels, etc.

ACE *chemical resistant equipment*
BY **AMERICAN** HARD RUBBER COMPANY
DIVISION OF **AMERACE** CORPORATION
ACE ROAD • BUTLER, N.J.

See ACE equipment in Chemical Engineering Catalog

Check 1997 opposite last page.

CP CORROSION CONTROL

Closeup of single loop shows two hard-faced elbows clearly

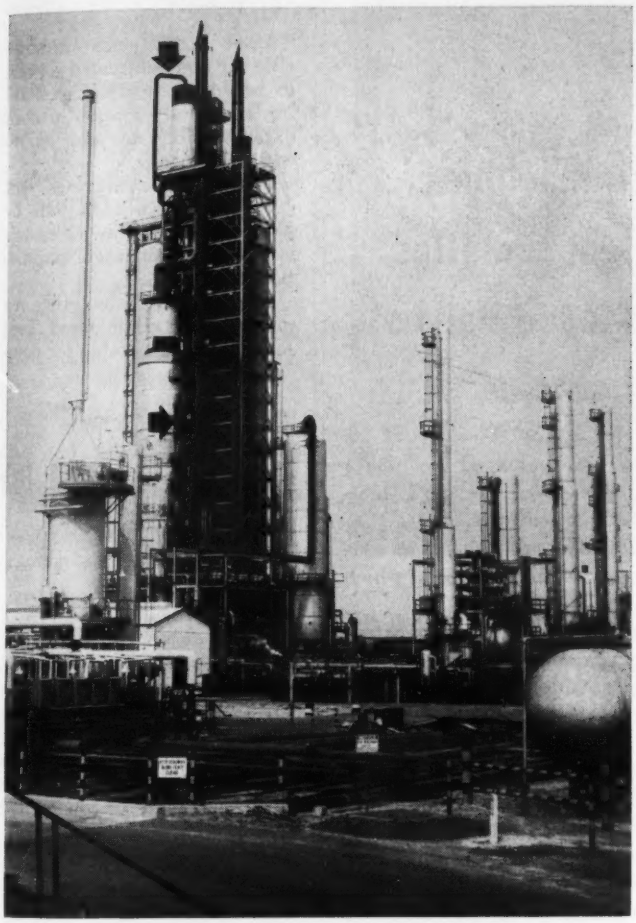
Critical areas of flue pipe elbows get protection with thin deposit of high-strength alloy

Hard-facing helps cat cracker resist hot, abrasive catalyst

PROBLEM: Abrasive silica-alumina fines (used as catalyst during the cracking of high octane fuels) were eroding the flue pipe elbows on big cat crackers at California Oil Company. The bead catalyst fines race past these elbows at about 125 fps and at a temperature of 1100°F. These conditions played havoc with the 24" diameter elbows, causing them to wear through in as little as eight months in many instances.

During the cracking process the fines are continually passing through the flue pipes at various zones of the 24-story cat cracker. Wear conditions are magnified at the elbows—especially at the outside radius. Same problem occurred at several locations.

This cat cracker has four elbows on the top zone, two elbows on the middle zone and four on the flue outlet from the disengager. Severe operating conditions such as these, especially at a temperature of 1100°F, indicated that a tougher metal would have to be used at the elbow location. The metal would have to remain hard and resist erosion from the hot, fast-moving, abrasive catalyst.



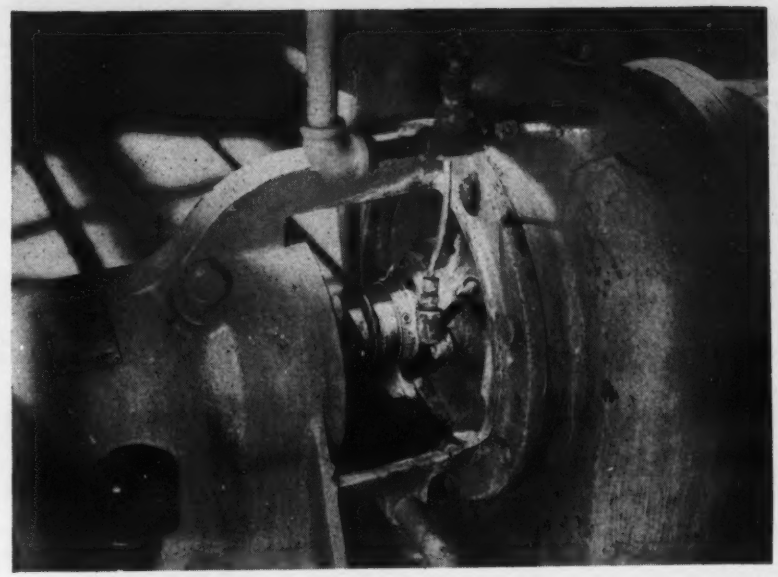
Arrows indicate location of two of loops, each of which uses two hard-faced elbows. Two similar loops on catalytic cracking unit are not visible

Solution: The trouble-plagued areas are now protected by an overlay deposit of ⅛" thick cobalt-base alloy hardfacing rod. This alloy was chosen because its high cobalt content provides built-in strength and hardness. The rod is applied by metallic arc welding to approximately half of the inside diameter of the elbow. This protects the entire outside radius of the 90° bend in the elbow. Each unit requires about 70 lb of alloy rod. No finishing is necessary after the rod is applied.

Results: Hard-faced elbows have lasted anywhere from one to five years, depending on their location in the cat cracker. Some elbows have been in service for a full five years without ever requiring maintenance. The problem of excessive wear and burnout of elbows has been virtually eliminated since the adoption of hard-facing at California Oil Company.

(Cobalt-base hard-facing rod is Haynes Stellite alloy No. 1. It is a product of Haynes Stellite Company, Division of Union Carbide Corporation, Kokomo, Indiana.)

Check 1998 opposite last page.



CHEMPRO MECHANICAL SEAL "HOLDS THE LINE" AGAINST 560,000,000 GALLONS OF ORANGE JUICE CONCENTRATE

In September, 1956, CHEMPRO MECHANICAL SEALS* were installed in 4 Allis-Chalmers high speed pumps located at the Minute Maid processing plant in Leesburg, Florida. The pumps recirculate orange juice through evaporators used to produce frozen orange concentrate.

So far, each pump and SEAL has handled approximately 560,000,000** gallons of concentrate. This service is so tough that most other previously used packings and seals needed frequent replacement. The original CHEMPRO MECHANICAL SEALS are still in operation *and there has been no leakage whatsoever in any of the pumps.*

*CHEMPRO MECHANICAL SEAL, Size 250 WLC, quenched, 316 stainless steel with Carbon vs. Ceramic Seal Faces.

**Pump handles 2,000 gal. of concentrate per minute and runs 24 hours per day, 7 days per week, for 7 to 8 months each year.

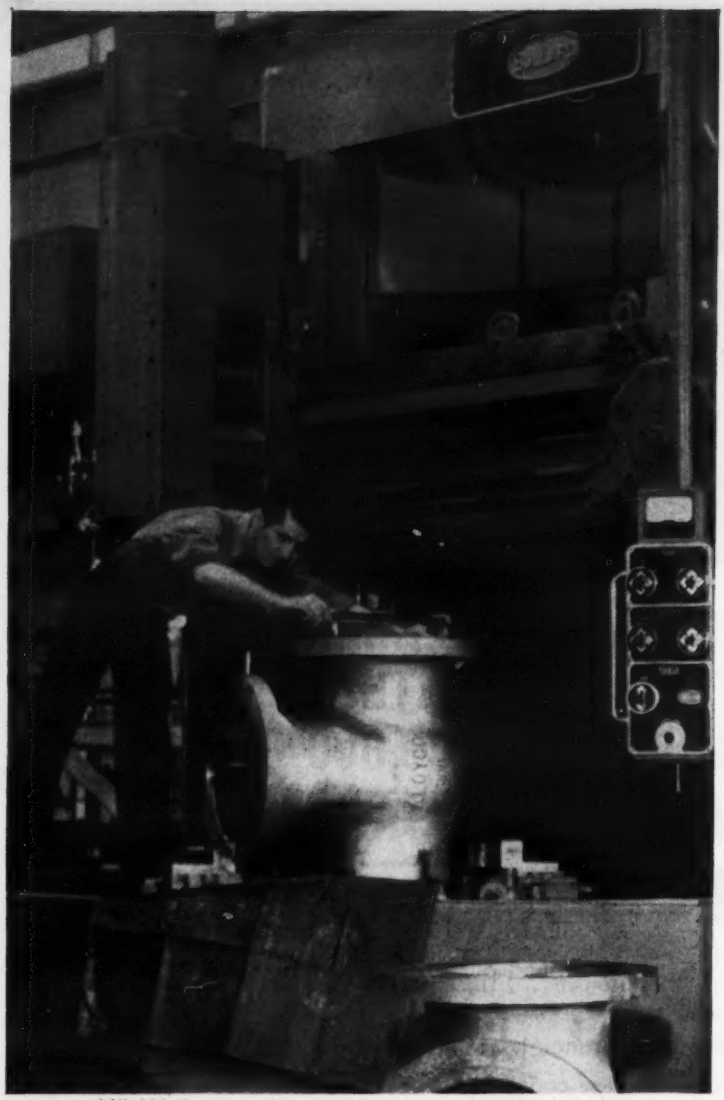
For information on CHEMPRO MECHANICAL SEALS IN TOUGH SERVICE, WRITE FOR BULLETINS CP-551 and 575.

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

9 Broadway, New York 4, N. Y.

Check 1999 opposite last page.



14" 300 lb. gate valve slated for a large petro-chemical plant, is being worked on one of Aloyco's battery of new Bullards.

Advanced machines... tools...test facilities expand Aloyco Valves' range of service

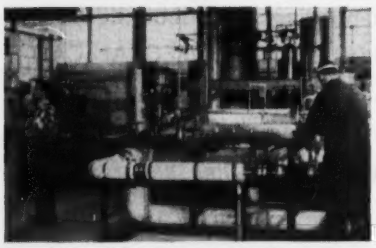
Constant change and improved techniques in modern fluid handling, pose a real challenge for valve manufacturers.

To meet these demands, Aloyco is constantly adding new facilities, some of which are pictured here.

For example, Aloyco Stainless Steel Valves are now available in sizes up to 24", pressures up to 2,500 lbs. at 650°F.

While these new facilities have improved and expanded the quality and usefulness of our entire line, they are particularly important, for example, in the manufacture of valves for the nuclear and missile fields.

For advanced knowledge and ideas plus the equipment to carry them out—take your next valve problem to the specialists: Alloy Steel Products Company, 1302 West Elizabeth Avenue, Linden, New Jersey. 9.8



One of finest hot test loops in the nation checks out valves at up to 2500 psi, 650°F. Hot tests can spot trouble that would otherwise be revealed only after months of line service.

New multimillion dollar Aloyco plant combines new production tools, test facilities, sales, administration, research and development offices and labs into single integrated unit.

Boroscope examination (in pressurized clean room) of specially made nuclear valves follows the application of dye penetrant.

ALLOY STEEL PRODUCTS COMPANY

LINDEN, NEW JERSEY

Boston • New York • Wilmington • Atlanta • Birmingham • Baton Rouge • Buffalo
Pittsburgh • Chicago • St. Louis • San Francisco • Los Angeles • Seattle

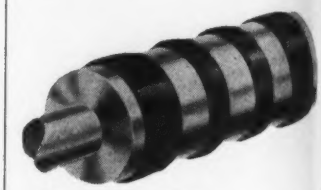
Check 2000 opposite last page.

Leakage, contamination prevented with filled Teflon piston rings

Uses: Piston rings are suitable for non-lubricated service to seal reciprocating, oscillating and rotary motion of both external and internal cylindrical surfaces.

Features: Piston rings will prevent leakage of liquids or gases as well as avoid corrosion and product contamination.

Description: Piston rings are made from carbon-filled Teflon. They are suitable for continuous service in a temperature range from −420 to 500°F. Mechanical strength and dimensional stability are excellent. Rings can also be furnished made of glass-filled Teflon.



Filled Teflon piston rings are suitable for service from −420 to 500°F

(Filled Teflon piston rings are product of The Garlock Packing Company, 444 Main Street, Palmyra, N.Y.)

Check 2001 opposite last page.

Cryogenic properties of aluminum alloy outstanding

Recent technical paper presents information on low-temperature tests run on aluminum alloy 5083. The recently developed aluminum-magnesium-manganese alloy is one of the strongest alloys of this type. Tests run at 75 to −320°F showed excellent weldability and weld ductility retention over this temperature range. In addition, alloy has good resistance to corrosion and stress corrosion.

Four types of tests were used to evaluate resistance of plate and welds to brittle fracture. Results showed that the

alloy may be used at temperatures down to −320°F without fear of failure from a ductile-brittle transition.

(Condensed from technical paper, "The Tensile and Impact Properties of Plate and Welds of Aluminum Alloy 5083-H113 Between 75 and −320°F," by R. D. Olleman and G. C. Wolfer, Department of Metallurgical Research, Kaiser Aluminum & Chemical Corporation.)

(For further information on aluminum alloy 5083 contact Kaiser Aluminum & Chemical Corporation, 1924 Broadway, Oakland 12, Calif.)

Check 2002 opposite last page.

Floor surfacing material resists sulfuric acid for 10 months

The Glidden Company required a corrosion-resistant mortar for section of their Baltimore plant where TiO_2 treatments are processed. Floors, pads and piers in this department are subjected to sulfuric acid spills and salts in varying concentrations.

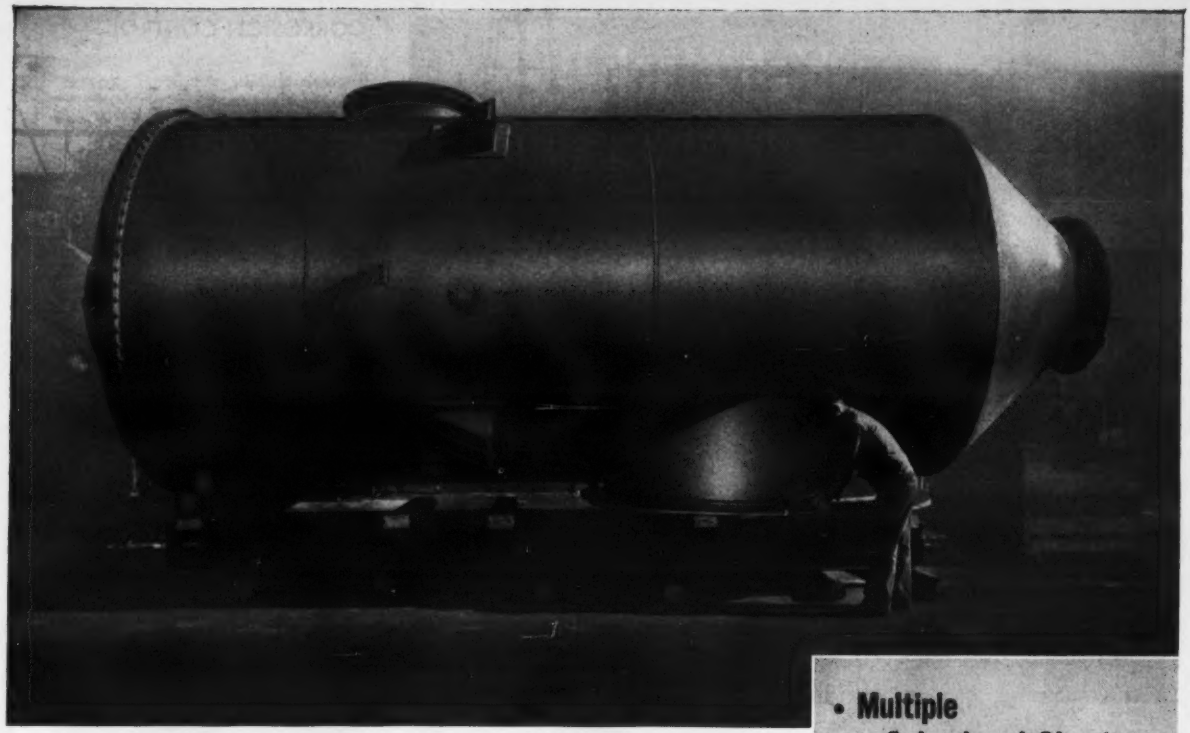
Solution: Engineering staff specified a coating known as Penntrowel, which is a modified epoxy resin with amine hardening agent and an inert silica aggregate. Product was installed on curbs and vertical side and pump pads over new concrete.

Results: After 10 months of daily exposure to highly corrosive chemicals, the floor is holding up well, a sharp contrast with cracks and corrosion which would have resulted with conventional concrete under same conditions.

(Penntrowel mortar is product of Pennsalt Chemicals Corporation, Three Penn Center, Philadelphia 2, Pa.)

Check 2003 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



MANHATTAN RUBBER LINED TANKS for PERMANENT Protection against Corrosion and Contamination

Costly process equipment for storing and handling corrosives deserves the degree of protection possible only with specially compounded, acid-proof Manhattan Rubber Linings. Thick, multiple calendered sheets of natural or synthetic rubber assure maximum durability under rough working conditions. The linings expand and contract with the tank metal under temperature changes . . . won't harden or crack. Their protection against most acids and alkalis is as fool-proof as 65 years of advanced technology can provide.

All Manhattan Rubber Linings are bonded to metal so securely actual tests have proved they can't be separated! And every Manhattan lined tank is tested under high voltage to assure flawless protection before being shipped to your plant. If your equipment is too large to ship to Manhattan, skilled crews will do the job at your location.

Be *sure* of permanent protection for your process solutions and equipment. Let an R/M representative show you the advantages of Manhattan Rubber Lined tanks, pipe and process equipment. Contact the Manhattan Rubber Lining plant or sales office nearest you . . . or write direct.

- Multiple Calendered Sheets
- Permanent Protection Against Corrosion, Contamination
- Permanent Rubber-to-Metal Bond
- Resistant to Acids, Alkalis, Abrasion, Temperature
- Largest Facilities Longest Experience
- Rubber Lining Plants at Passaic, N. J. North Charleston, S. C.

Write for Catalog No. 7115

RM 1008

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

RM

ENGINEERED RUBBER PRODUCTS . . . MORE USE PER DOLLAR

Check 2004 opposite last page.

which stack
would YOU use for
corrosive fumes?
8888-CC
This stainless steel stack failed after only 6 months in corrosion service!
Over 2 years old . . . yet this Duracor stack shows absolutely no signs of attack inside or outside!

DURACOR VENTILATING SYSTEMS PROVIDE LASTING CORROSION RESISTANCE AT LOW COST!

Performance-proven Duracor Ventilating Systems and components provide outstanding resistance to attack from all types of corrosive fumes. These high-strength systems are corrosion-proof throughout . . . are practically immune to weathering . . . require only minimum support! Best of all, Duracor construction can save you up to 30% on your initial investment . . . and it's maintenance-free! Ceilcote engineers will design a complete Duracor system to meet your special requirements . . . or modify your present system to permit gradual conversion to Duracor. Fabricated to meet customer specifications . . . or assembled from stocked component parts . . . Duracor Ventilating Systems can be easily installed by regular plant maintenance crews or by experienced Ceilcote installation personnel. Write today for the new Ceilcote catalog.

DURACOR CEILCOTE

ANOTHER PRODUCT OF

THE CEILCOTE COMPANY, INCORPORATED

4834 Ridge Road • Cleveland 9, Ohio

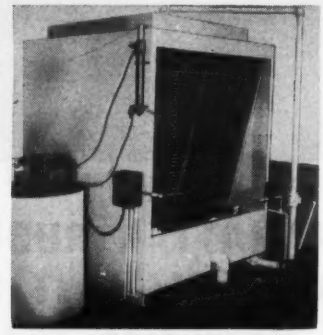
Check 2005 opposite last page.

Water-treatment feeder prevents corrosion, scale and algae

Uses: For use with refrigeration and air conditioning systems.

Features: Unit eliminates 'drift' of treatment and simplifies control.

Description: Hydrotrol feeder and controller provides for automatic adjustment of chemical feed and 'bleed off.' In this way these variables are always in direct proportion to rate of water evaporation or cooling load on the system.



Water-treatment feeder and controller prevents damage to refrigeration and air conditioning systems

Unit is designed for use with either acid or alkaline treatments.

Water-treatment feeder and controller saves in water analysis, control labor and attention required. It also makes possible savings in chemicals and water.

(Hydrotrol water-treatment feeder is product of Heller Laboratories, Inc., 124 Fort Lee Rd., Leonia, N.J.)

Check 2006 opposite last page.

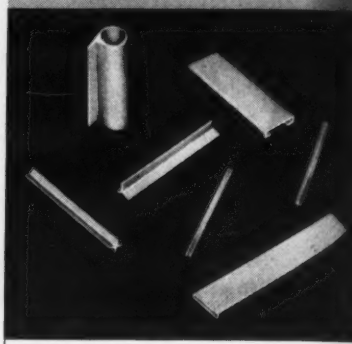
Detect corrosion in billionths of an inch

Recently developed sensing elements can detect as little as five billionths of an inch of metal loss. Product is essentially a vacuum-deposited film of metal, 2 to 50 millionths of an inch thick. Indicators are available in visual and elec-

NO MOLDS—NO WASTE—NO MACHINING

PF EXTRUDED TEFLON* SHAPES Reduce Cost of Components

for chemical applications



Some of the many shapes extruded by Pennsylvania Fluorocarbon for the chemical and mechanical industries include: fluid separators, feeding tubes for small parts, channels and seals.

These shapes offer:

- the widest service temperature range of any plastic (-450°F. to +500°F.)
- complete chemical inertness
- lowest coefficient of friction of any solid material
- very low permeability

Extreme Dimensional Accuracy Assured On Any Appropriate Design

PF extruded shapes made from Teflon allow design engineers to incorporate the chemical inertness and low coefficient of friction of Teflon into their products, economically. PF extrudes intricate Teflon shapes to extremely close tolerances, cuts them to lengths, post forms to requirements and performs any auxiliary machining steps. Molds are eliminated, there is no waste of Teflon and, frequently, no additional finishing operations are necessary. Result? Teflon components of extreme accuracy at lower cost.

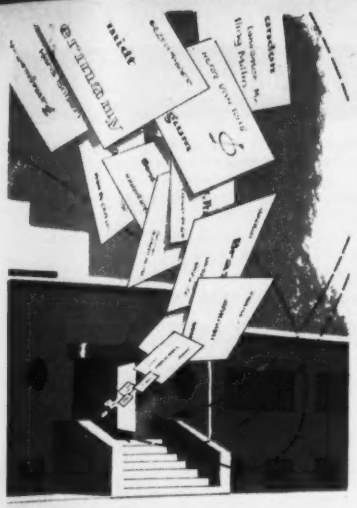
Write, wire or call for a quotation on your particular Teflon component requirements, regardless of the intricacy of the shape. Shapes ranging from 2500 feet per pound to 6 feet per pound can be extruded.

PENNSYLVANIA FLUOROCARBON CO., INC.

1115 N. 38th Street, Phila. 4, Pa.
EVergreen 6-0603 TWX: PH 252

*DuPont registered trademark

Check 2007 opposite last page.



The World's Business Cards Come to A-P-C for O. E. M. Components in Stainless Steel

A-P-C's reputation for solving knotty problems in stainless steel design and craftsmanship, reaches far beyond the borders of this country.

Good news spreads quickly. Tests, trials and acceptance of A-P-C *engineered* stainless steel parts and end-products for a multitude of industries has won many, many overseas friends from all continents.

So whether you are searching for a highly trained, dependable source for the solution of special problems in the chemical, petrochemical industries or in the broad classification of "metal working," call upon A-P-C's experience and ingenuity for the answers.

There's a highly informative brochure on A-P-C's facilities and products available to you on request. You'll want it for your files. Just send a postcard. Ask for "General Catalog M or C."

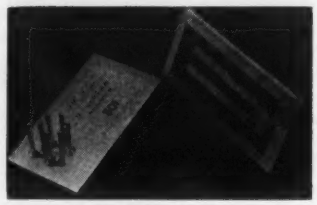
ALLOY PRODUCTS CORP.

1075 Perkins Ave., Waukesha, Wis.

2059

Check 2008 opposite last page.

trical versions. With visual models, high contrast between sensitized portion and reference portion permits instant recognition of corrosive conditions. Another type is designed



Corrosion indicator is so sensitive it will detect corrosive conditions before product is attacked

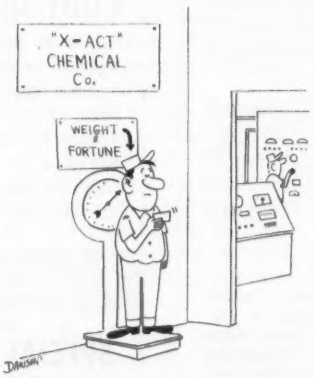
for use with Corrosometer in applications where it is desirable to establish approximate rates of corrosion.

(MagnaFilm corrosion indicators are product of Crest Instruments, Div of Magna Products, Inc., 11808 S. Bloomfield Ave., Santa Fe Springs, California.)

Check 2009 opposite last page.

Reinforced plastic tanks are covered in four-page bulletin. One page gives detailed information on the chemical resistance of the reinforced polyester. A photograph of an 18000-gal storage tank made of the material is shown. A photo of a reinforced polyester manhole is also shown. "Kabe-O-Rap" — Metal Cladding Inc.

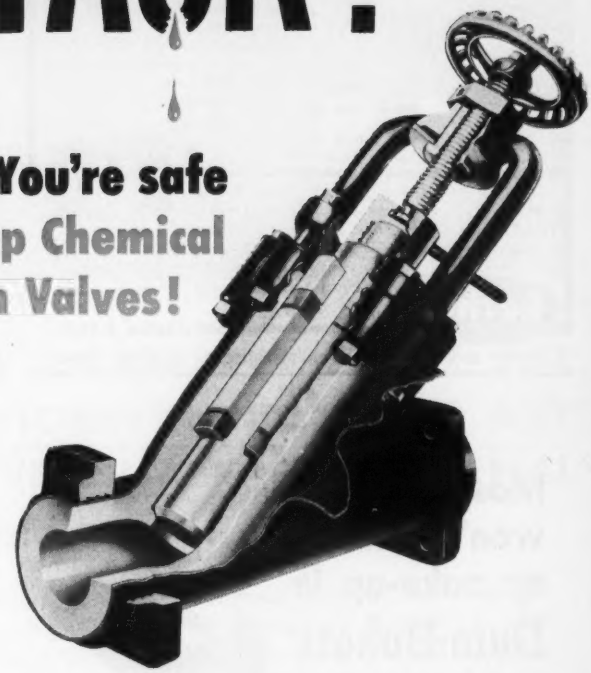
Check 2010 opposite last page.



". . . and you have an excellent future, chemically speaking, of course!"

ACID ATTACK?

You're safe with Lapp Chemical Porcelain Valves!



Now you can valve acids as easily as water! The solid porcelain of these Lapp valves is chemically inert, immune to corrosion from all acids (except hydrofluoric), and absolutely impervious. There's *extra* protection, too, in the TUFCLAD® armor that cushions the porcelain body against impact and insulates it against thermal shock.

Best of all . . . Lapp Chemical Porcelain Valves cost you far less than corrosion-resistant alloys and lined equipment. And they practically never need maintenance or replacement.

There's a full line to fit your process . . . Y-Valves and Angle Valves, in ½" to 6" sizes. Also safety valves, check valves, plug cocks, pipe, fittings (to 8" diameter), and special shapes.

WRITE *for Catalog 567.*
Lapp Insulator Co., Inc.,
2105 Chestnut Street, LeRoy, N. Y.

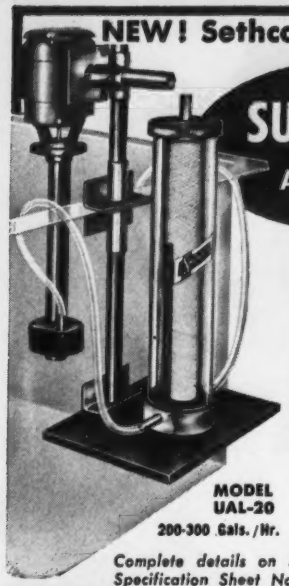
Lapp
CHEMICAL PORCELAIN

Check 2011 opposite last page.

NEW! Sethco corrosion proof

SUMP PUMP AND FILTER

handles all acid, alkaline solutions and solvents up to 250°



MODEL UAL-20
200-300 Gals./Hr.

Self - priming, leakproof Epoxy sump pump provides continuous duty performance. Bracketed inside the tank, it requires no floor space. Outside bracket supports High Temp. Lucite or Epoxy filter chamber . . . resistant to all corrosive solutions and solvents. ½ or ¾ HP motor. Pump and filter chambers are available separately.

Complete details on Sethco Specification Sheet No. 751

WRITE for NEW illustrated 8 Page Brochure . . . complete line of SETHCO FILTER PUMP UNITS (50 to 2700 Gals./Hr) providing Depth Filtration for all chemical applications. Includes special informative 'Filter Pump Selection Guide'

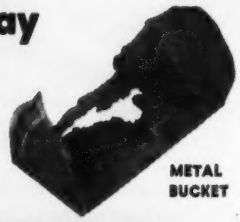
Sethco

MAyfair 3-4220

2287 BABYLON TURNPIKE, MERRICK, L. I., NEW YORK

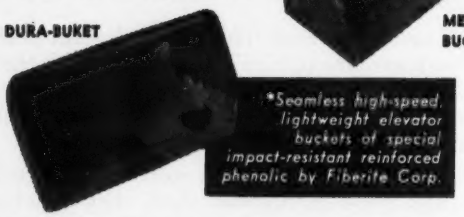
Check 2012 opposite last page.

Most chemicals won't eat away or cake-up in Dura-Bukets*



DURA-BUKET

METAL BUCKET



*Seamless high-speed, lightweight elevator buckets of special impact-resistant reinforced phenolic by Fiberite Corp.

On chemical product elevator legs . . . where ordinary metal buckets corrode to uselessness in weeks . . . DURA-BUKETS resist chemical reaction and continue in service for years. DURA-BUKETS elevate a full payload on each pass over the head pulley because they don't cake-up. Self-cleaning DURA-BUKETS are more sanitary, too. The spark and static proof quality of DURA-BUKETS makes them perfect for elevating dusty or flammable materials.

DURA-BUKETS don't eat up profits . . . they elevate them. With DURA-BUKETS you can slash replacement costs and down time. WRITE FOR DETAILS AND PRICES.

Dura-Buket DIVISION OF NATIONAL OATS CO. • EAST ST. LOUIS, ILLINOIS

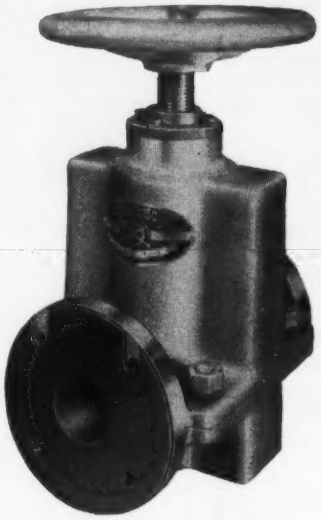
Check 2013 opposite last page.

Acids, abrasive pulps and slurries handled by squeeze valve

Uses: For on-off throttling operations.

Features: Materials flow straight through valve without making contact with any metal parts.

Description: Operating stem of valve is designed to move closing jaws equally toward center, reducing strain on valve tube. Liner is a one-piece molded, cord-reinforced



Valve body is available in aluminum or cast iron and may be plastic covered where corrosive environments require it

tube of rubber or neoprene. Maximum temperature recommended for natural rubber liner is 180°F and for neoprene, it is 210°F. Standard unit is designed for liquid service to 100 psi.

(Model D-SV-100 squeeze valve is product of The Galigher Company, P O Box 209, Salt Lake City 10, Utah.)

Check 2014 opposite last page.

Coating process, which makes metal corrosion resistant, is presented in two-page data sheet. Physical, chemical and fabrication properties of the Nicro-coat surface protection method are covered. Data Sheet 4.5 — Stainless Processing Div., Wall Colmonoy Corporation.

Check 2015 opposite last page.

GOLD SICON withstands 500°F.

Gold SICON protects the grill and grill pouch of this attractive Quaker space heater under temperatures of over 500°F., without peeling, flaking, powdering or discoloring. *And it will retain its bright appearance indefinitely!* Do as Heil-Quaker did. Test SICON . . . up to 1000°F. for Sicon-Aluminum or black . . . from 500° to 650°F. in gold or other decorative colors. Write for Sicon brochure and free sample offer . . . today!

SICON, protects and preserves—wherever there is heat.

Sicon Hi-Temperature finish by MIDLAND Industrial Finishes Company Waukegan, Illinois

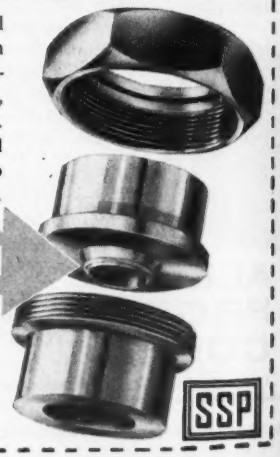
E-3

Check 2016 opposite last page.

new Koncentrik Stainless

PIPE UNIONS HAVE A Fully Confined TEFLON SEAL

Exclusive design is ideal for high pressure and high vacuum applications. Pressure ratings — 2,000#, 3,000#, 4,000# and 6,000#. Screwed or socket weld ends, for pipe sizes ⅛" to 2". Write for catalog today.

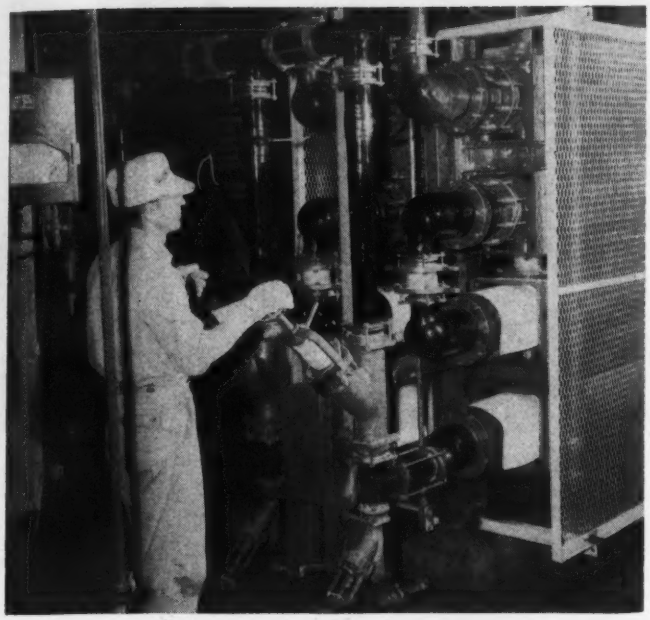


Fully Confined

THE SPECIAL SCREW PRODUCTS COMPANY Bedford, Ohio

SSP

Check 2017 opposite last page.



Glass heat exchangers in service at Dow

Dow uses glass exchangers for corrosive bromine solutions

Units also serve as condensers in the production of more than 100 bromides

CORROSIVE solutions contact only glass, Teflon and ceramic materials in eight heat exchangers used at the Midland plant of The Dow Chemical Company. The eight exchangers — two sets of four units — are now operating in series. They are successfully handling ethyl dibromide containing bromine and hydrobromic acid.

These same Pyrex heat exchangers have found use as condensers during the past three years at Dow. Each condenser consists of 26 tubes, each with less than 0.03" wall thickness. Condensers are multipurpose units that can be used to produce all of the more than 100 bromides manufactured at Midland plant.

Converting to glass heat exchangers from type previously used made it possible to reduce area needed for each production unit from 2300 to 400 sq ft. Glass exchangers have also been found to be less expensive and more efficient. Thinness of glass condenser tubes permits efficient process design.

Pyrex heat exchangers and condensers have been subject to only a minimum of breakage at Dow. Few instances of tube breakage that have occured have been due to foreign objects in process stream rather than dropped metal objects.

(Pyrex-brand glass heat exchangers in use at The Dow Chemical Company are product of Corning Glass Works, Corning, New York.)

Check 2018 opposite last page.

"KEMITE"

For Lower Installation and Maintenance Costs

FLEXIBLE RUBBER PIPE FOR THE SAFE, EFFICIENT HANDLING OF ANY CORROSIVE OR ABRASIVE MATERIAL

Hot or Cold . . . Wet or Dry

Extreme flexibility permits installation of "Kemite" Duct in long, curving lines with few intermediate connections. Connections are quickly and easily made by use of "Flang-Lok" Flanges (see insert) which provide a non-metallic, permanently leakproof seal. "Kemite" is built to combat costly maintenance, repairs and early replacement. Tube is highly resistant to extremely corrosive or abrasive materials. Patented wire-reinforced carcass will not kink or collapse. Cover is tough, durable and impervious to the actions of acids and fumes. Standard sizes: 1" to 4". For suction and discharge.

Contact Our Nearest Branch for Details and Prices

"If it's GOODALL, it MUST be Good!"

See Pages 338-339, Chemical Engineering Catalog

Standard of Quality—Since 1870

HOSE · BELTING · FOOTWEAR · CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

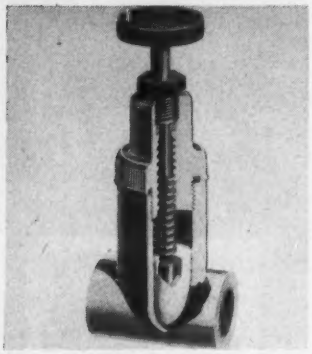
BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES

IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO

Check 2019 opposite last page.

Temperatures to 250°F suitable for Penton gate valve

All inorganic acids except fuming nitric and fuming sulfuric are generally resistant to throttable, Penton gate valve.



Valve provides close throttling control

Temperatures in range of 212-250°F will not cause elongation of valve.

Unit has the feature of straight-through flow with no pressure drop. Valve is available in sizes from ½ to 2" with socket weld, flanged or threaded ends.

(Penton gate valve is product of Vanton Pump and Equipment Corp., Hillside, N.J.)

Check 2020 opposite last page.

Protective coating system for severe exposures which requires only one coat is discussed in two-page bul 540A — Prufcoat Laboratories, Inc.

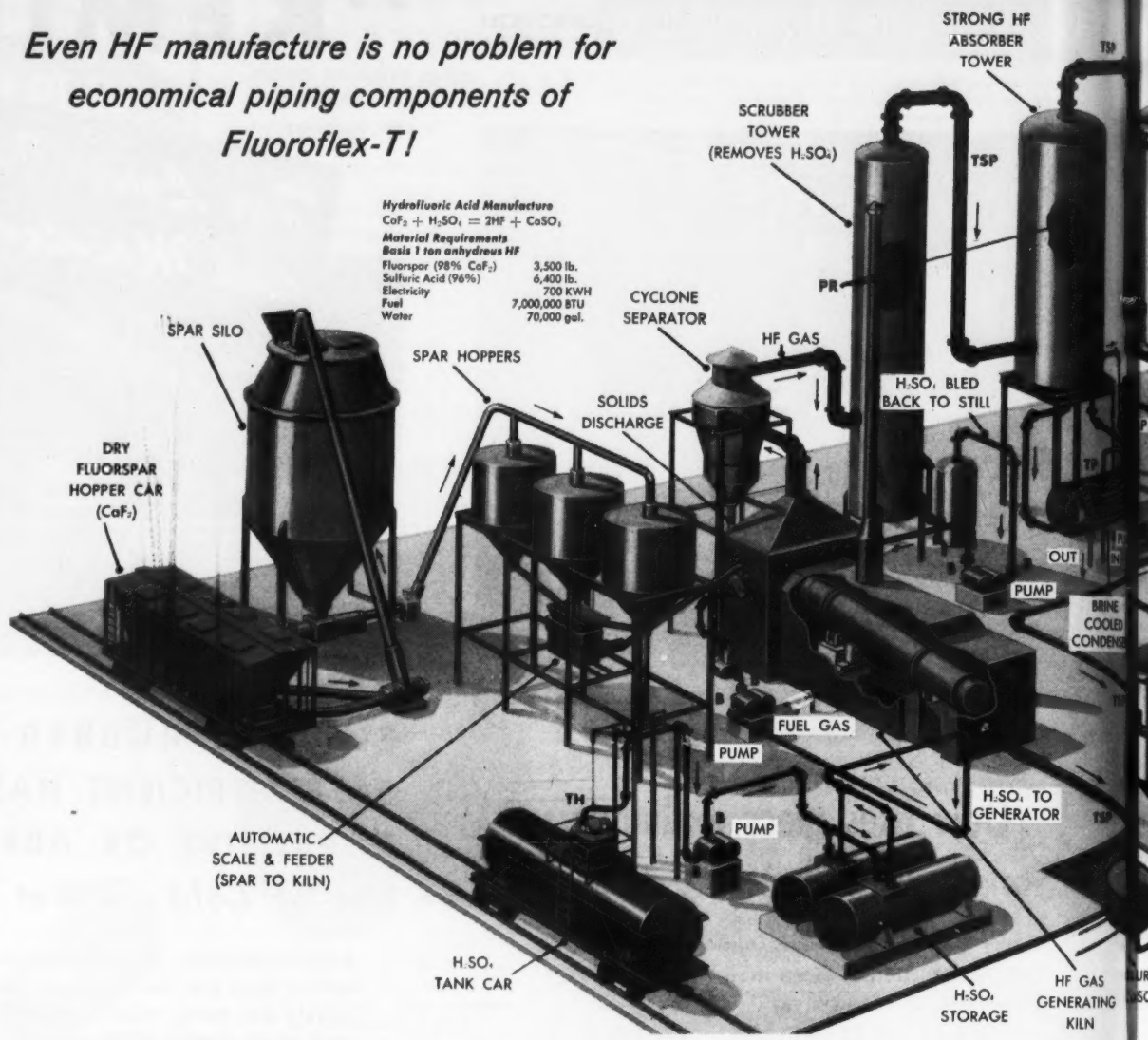
Check 2021 opposite last page.

Ball valves available in various alloys to fight corrosion

Seats can be provided in Teflon or Buna

Recently announced ball valves are designed for handling corrosive liquids. Body is available in stainless, cast steel, ductile iron, cast iron or bronze. Balls can be chrome-plated carbon steel, bronze, or stainless steel. Seats are furnished in Teflon or Buna,

Even HF manufacture is no problem for economical piping components of Fluoroflex-T!



NOW AT LAST, for all your corrosive of long-life, corrosion-

Now it is possible for you to pipe your entire corrosive process from start to finish in corrosion-impervious Fluoroflex®-T, to save you money in faster installation, and decreased maintenance, process downtime, replacements, and production headaches!

Fluoroflex-T, the proprietary Teflon® product manufactured and fabricated solely by Resistoflex, combines two important elements:

1. The widely-known corrosion-imperviousness of Teflon; complete resistance to *any* chemical (except high-temperature fluorine and the molten alkali metals) up to 500°F.!

2. Optimum flexibility, density, strength, and flex-life; non-porosity and structural uniformity; all imparted by Resistoflex's superior fabrication techniques.

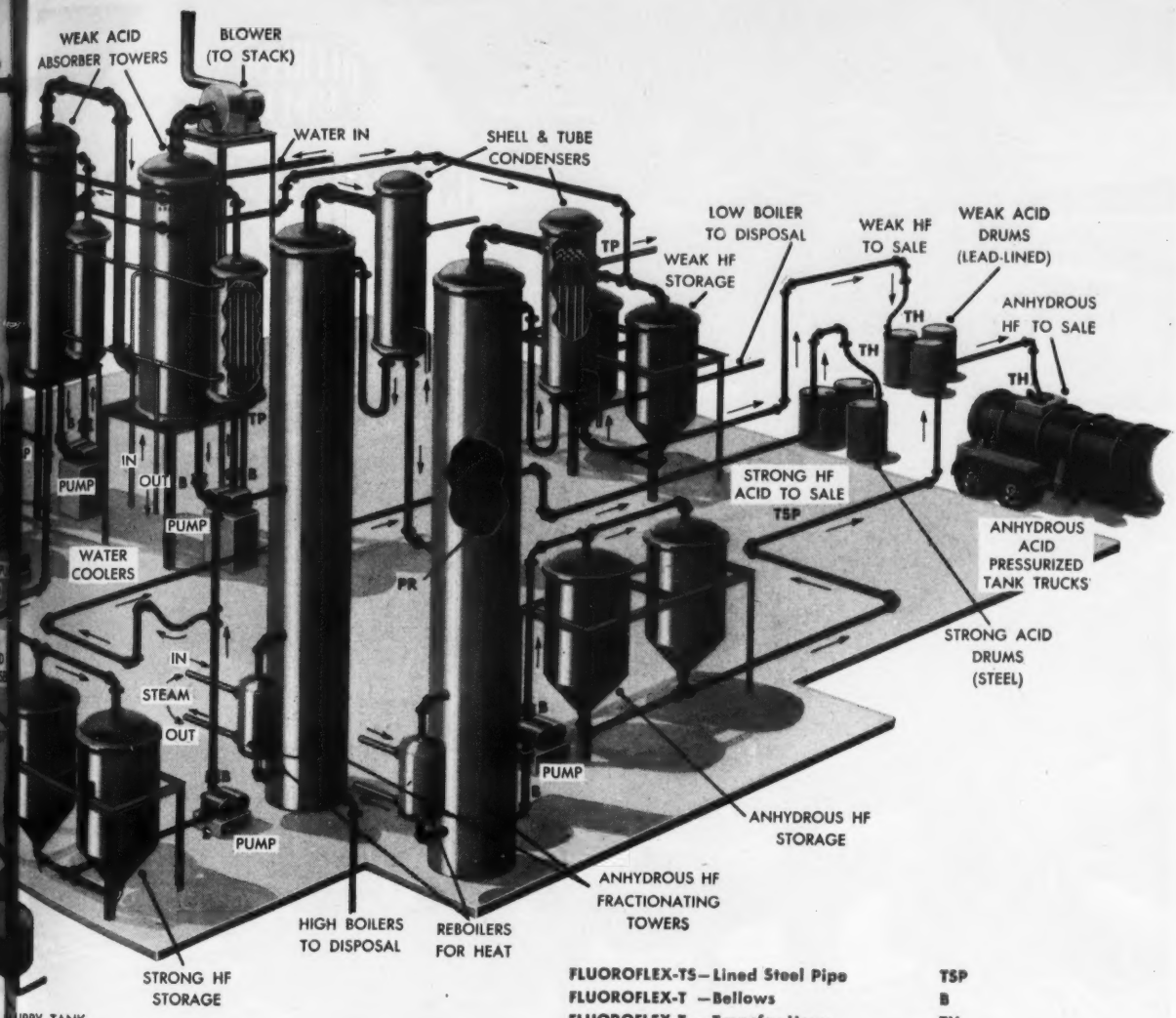
As to the kind of economies possible, one plant equipped with Fluoroflex-T reported savings of $60,000 per month in costs of maintenance, downtime, and product loss!

This in addition to installation economies. The Fluoroflex-T family of corrosion-resistant piping components (see panel at side) have all been designed for complete couplability and hookup ease, in a complete range of sizes to fit any flow, process, or process path.

If *you* have problems of handling corrosive fluids—in cost, equipment maintenance and replacement, process downtime—why not talk them over with Resistoflex? As they have for others, their fully experienced staff of engineers and equipment specialists may be able to save *you* money, time, and headaches! Write for Bulletin today!

Check These Versatile Fluoroflex-T Piping Components for Economy, Installation Ease, Long Process Life!

Fluoroflex-T Lined Steel Pipe: Prefabricated to section lengths, conforming to your blueprint specs, with flanges on and ready to assemble. Minimizes assembly time; shortens checkout time; suitable for all fluids; complete series of fittings and connections available.



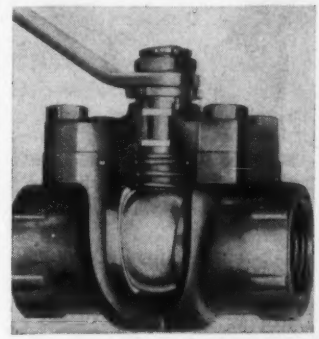
FLUOROFLEX-TS—Lined Steel Pipe	TSP
FLUOROFLEX-T —Bellows	B
FLUOROFLEX-T —Transfer Hose	TH
FLUOROFLEX-T —Tube Protectors	TP
FLUOROFLEX-T —Raschig Packing Rings	PR

according to application.

Valves are offered in two types, both of which provide full flow tight shutoff and a quick quarter turn for opening or closing.

McCannaseal type has two-way flow, minimum pressure drop and self-adjusting seats. Ball is cradled in a slight wedge formed by angle of seats. As slight wear occurs on seats, spring pressure forces the ball and seats deeper into wedge, maintaining positive shutoff. This type of valve also has top entry for easy maintenance and requires no lubricant. It has a non-cycling, non-torsional, non-corrosive spring.

McCannaflo ball valve has a compact design that provides short end-to-end dimensions and a lower overall height. This provides a positive indication of valve position and has a back-seating stem with double seals. Interchangeable seat design furnishes positive shutoff and extends valve life.



Cutaway view of McCannaseal ball valve shows angle-position of seats, permitting top entry removal. Handle extends outward at upper left

Both valves are suitable for temperatures to 350°F. The McCannaseal can withstand pressures to 700 psi and the McCannaflo, 1000 psi. They can handle practically all fluids, semi-solids, compressed gases and compressed air. Pressure may be applied from either side.

(Ball valves are product of Hills-McCanna Company, 4600 West Touhy Ave., Chicago 46, Illinois.)

Check 2023 opposite last page.

piping problems, the overall economy proof FLUOROFLEX-T (TEFLON)!

Chemical Transfer Hose: Completely resistant to corrosion; long flex life; available in rubber or stainless steel braid coverings. The answer to all your flex hose problems!

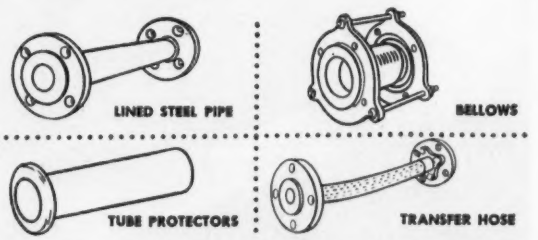
Molded Bellows-Flex Joints: Up to one million flexings without detectable deterioration! Adjust to longitudinal and temperature movements, damp out equipment vibrations. Molded rather than machined, their built-in flex-life can add years to the life of your piping and equipment!

Dip Pipes, Spargers, Thermowells: For non-corrosive nozzle openings, steam nozzles, instrument wells in process equipment.

Condenser Tube Protectors: Eliminate erosion and corrosion of high-velocity acid in entry side of condenser tubes.

And also:

Fluoroflex-T Tower Packing Rings: Light in weight, durable, corrosion and erosion resistant, these economical Raschig rings have only one-fourth the weight of monel rings! Next time you need tower packing, check on these to simplify your tower design, costs, maintenance problems!



RESISTOFLEX CORPORATION

Complete systems for corrosive service

Plants in Roseland, N. J. • Anaheim, Calif. • Dallas, Tex. • *Sales Offices* in major cities

*Fluoroflex is a Resistoflex trademark, reg. U. S. Pat. Off.
*Teflon is DuPont's trademark for TFE fluorocarbon resins.

Check 2022 opposite last page.

Live steam transmitted by tough flexible Teflon hose

- Is completely resistant to most chemicals

Uses: Although it is completely resistant to the majority of corrosive chemicals,

Steam hose resists deterioration, abrasion, scaling, blowoffs and leakage

hose was specifically designed to provide protection from steam. It will resist steam additives and vaporized oils in the steam lines.

Features: Hose will not embrittle, work harden or deform even after many flexing cycles at 400°F.

Description: Hose incorporates an extruded Teflon innercore, bronze wire reinforcing braid and swaged fittings. Use of swaged fittings is a major contribution to the reliability of the hose. Sizes range from ¼ to 1".

(White Line steam hose is product of Titeflex, Inc., Hendee Street, Springfield 4, Massachusetts.)

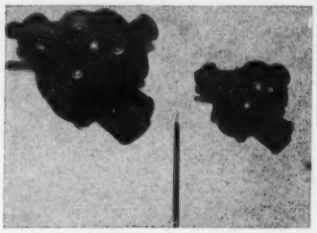
Check 2024 opposite last page.

Corrosion-resistant valve cuts off fluid flow instantaneously

Lightweight, corrosion-resistant, chemical flow-control and shut-off valves are designed to provide instantaneous cut off of liquid flow for

such applications as spray drying.

Two-way valves incorporate an aspirator system in bypass port to create an immediate negative pressure on full flow downstream port when valves are actuated to the bypass



Valves are good for such applications as spray drying

position. This feature immediately reduces downstream line pressure and cuts off liquid flow.

Units are available so they can be assembled or disassembled without removing valve from piping system. They can be furnished with pipe threads, hose fittings or tubing connections in 1 to 2" sizes.

(Agavenco flow-control valves are product of Agricultural Aviation Engineering Co., 858 Scott St., Santa Clara, Calif.)

Check 2026 opposite last page.

CAN CUT YOUR PUMP INVENTORY COSTS AS MUCH AS 85%

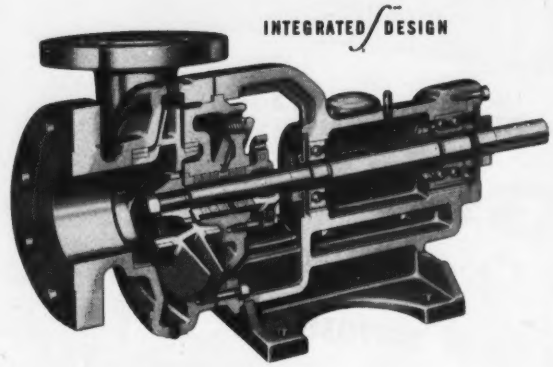
Maximum interchangeability means far fewer parts required to fill all your day-to-day needs.

The effectiveness of integrated design of Peerless Type DL and DM process pumps can probably best be shown by a recent customer's order. This customer purchased 150 process pumps for his plant. Of the group, 120 have interchangeable parts. As a result, pump inventory of spare parts can now be cut to a fraction of former requirements freeing important dollars for many other uses. And with the greater interchangeability, the customer predicts even more savings because of speedier maintenance work and less time lost waiting for proper parts.

And, if interchangeability of Peerless Type DL and DM pumps captures your interest, please remember this fact. Because Type DL and DM pumps are of integrated design, you can order them out of stock just the way you need them. For example, there is a choice of semi-open or enclosed impellers; water or air cooled backplates; oil or grease lube bearing housing; packing or mechanical seals; and liquid ends of any machineable metal.

There is one more point to be told about these pumps. They are real performers. Proven time after time, they efficiently pump virtually all liquids used in the process industries.

INTEGRATED ∫ DESIGN



VERSATILE IS THE WORD FOR THIS PEERLESS DL—DM PROCESS PUMP

The Peerless Type DL and Type DM process pumps will handle virtually all liquids used in the chemical, process and refining industries. Both models are single stage, single suction centrifugal types with a vertically split case, and both models have capacities to 1000 gpm, heads to 430 feet and working pressures to 300 psig. Type DL models have a temperature range of 250°F, while the Type DM models have a range of 450°F.

FOR EXAMPLE: WITHIN FIVE DIFFERENT SIZE PUMPS THESE 22 PARTS ARE INTERCHANGEABLE—

1. Shaft
2. Back plate
3. Packing rings
4. Radial bearing
5. Packing gland
6. Thrust bearing
7. Pump frame
8. Impeller lock nut
9. Bearing lock nut
10. Seal lantern packing
11. Key
12. Thrust plate
13. Water slinger & set screw
14. Lockwasher-bearing
15. Gasket-volute case
16. Gasket-thrust plate
17. Oil retainer plate
18. Oiler; constant level
19. Lockwasher-impeller
20. Gland clamp
21. Splash plate
22. Retaining ring bearing

INTEGRATED ∫ DESIGN FOR GREATER EFFICIENCY AND SAVINGS

PEERLESS PUMPS

Putting Ideas to Work

fmc Peerless Pump HYDRODYNAMICS DIVISION

Offices:
New York; Detroit; Cleveland; Chicago; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno.
Distributors in principal cities.
Consult your telephone directory.

Peerless Pump, Hydrodynamics Division, Food Machinery & Chem. Corp.
301 West Avenue 26, Los Angeles 31, California
Send me Bulletin B-1608 ☐ Have field engineer contact me ☐
Company_____
Name_____
Address_____
City_____ State_____
CP

Check 2025 opposite last page.

"Are you sure you checked the flow diagram?"

FRED W. STENNIS, BORDEN CHEMICAL CO.

If cold-applied protective coatings aren't standing up under *your* corrosive conditions, try Tygon* *Hot Spray*. You'll get a longer-lasting, better-protecting paint film. Adhesion is better. The film is denser, without pinholes. And Tygon *Hot Spray* offers all the corrosion protection inherent in Tygon Plastics — known wherever corrosives are handled.

Check these important advantages — and then switch to Tygon *Hot Spray:*

✓ ***3 Mil Thickness in a Single Pass.*** Two coats provide a five to six mil thick coating. (Equal to five coats of cold-applied vinyl coatings.) You'll save 30% or more in application costs.

Tygon is a registered Trade Mark of The U. S. Stoneware Co.

✓ ***Minimum Down Time.*** Tygon *Hot Spray* dries almost instantly. Paint tonight—back in service tomorrow. You'll save hours of costly down time.

✓ ***Less Overspray.*** Means less masking, less material, no paint fog. You'll save material, labor and clean-up time.

✓ ***No Thinners Needed.*** Heat at 160°F. reduces Tygon *Hot Spray* to spraying consistency. The small amount of solvent in the paint evaporates almost instantly.

Add to these: Tygon's superior corrosion-resistance, its flexibility and high resistance to mechanical damage, its low applied cost —and you get a convincing picture of the reasons why more and more companies are switching to Tygon *Hot Spray* Paint.

Write for this TYGON DATA BOOK

Contains complete details on how and where to use Tygon Hot Spray, plus useful information on other Tygon Coatings.

187F-3

PLASTICS AND SYNTHETICS DIVISION

U. S. STONEWARE

AKRON 9, OHIO

Check 2027 opposite last page.

NEW LITERATURE
Corrosion Control

Corrosion computer is a slide rule that tells what alloys should be used for a large variety of corrosives. It can be used in conjunction with 24-page corrosion guide that gives additional information on alloys available for fastenings and the compounds they will resist. Corrosion Computer and Guide — The H. M. Harper Co.

Check 2028 opposite last page.

Corrosion test samples, which are available to equipment users, are discussed in four-page bulletin. Type of samples, materials of construction and recommended testing procedures are explained in Bul 981 — The Pfaudler Co., a Division of Pfaudler Permutit Inc.

Check 2029 opposite last page.

Cooling water treatment data sheet includes information on the Dianodic method of corrosion control and how it is used for open circulating water systems. "Water Conditioning Data Sheet" — Betz Laboratories, Inc.

Check 2030 opposite last page.

Epoxy floor which is resistant to acids, alkalis and solvents, is explained in four-page bulletin. Topping material cures quickly and withstands abrasion. "Epoxy Floors" — Kalman Floor Company.

Check 2031 opposite last page.

Aluminum bronze alloys, with high resistance to wear, abrasion, fatigue and corrosion, are discussed in bulletin. Nine grades, along with recommended applications for each, are given in the 20-page bulletin 33e — Ampco Metal, Inc.

Check 2032 opposite last page.

Plastic fabrications and fittings for corrosive applications are covered in four-page bulletin. Among items discussed are fume removal systems, fume scrubbers, plastic tanks, piping, fittings and valves. Materials used are polypropylene, polyethylene and PVC. "Plastic Fabrications And Fittings" — Argo Plastic Products Company.

Check 2033 opposite last page.

Chromium diffusion process, called Alphatizing, a successful process for providing a steel surface with a chromium finish, is discussed in 22-page technical report. Procedure is an economical method of furnishing corrosion resistance. Specific applications are discussed in report. "Alphatizing" — Alloy Surfaces Company, Inc.

Check 2034 opposite last page.

THAT'S INTERESTING

Uplifting travel

A vehicle that promises to upgrade travel in the near future is a flying platform or air cushion vehicle which recently made a debut in this country. Craft can travel over any at 50-60 mph, hovering two feet above the ground, water or swamp. Propeller that resembles fat attic fan, mounted horizontally on the craft, forces air downward. This air escapes around edges of machine creating cushion of air between craft and ground, hoisting it into air. Curtiss Wright Corp. is taking orders for Air-Car, its model.

Aluminum output up

Production of aluminum totaled 1,953,039 tons for 1959, a 25% increase over 1958, and 16% better than previous record set in 1956.

For more information on product at right, specify 2035 see information request blank opposite last page.

COMPARE

THE ECON-O-MISER BALL VALVE...

The most advanced replacement valve for ON-OFF applications

Engineered design simplicity provides superior performance plus real dollar savings. • Remove 4 bolts—the center section lifts out—unions are eliminated. Service time and cost are reduced to a matter of minutes and pennies, and the valve is right back in operation. Costly spare parts are a thing of the past. • The Econ-O-Miser Ball Valve answers thousands of difficult application problems—simply—efficiently. Available from ¼″ through 6″ size range, it is ideally suited to difficult media, because of its smooth round flow and quarter-turn operation. • If you're interested in valves, you're interested in the Econ-O-Miser Ball Valve. Complete, up-to-date technical information is yours for the asking.

WORCESTER VALVE CO., INC.

16 PARKER STREET, WORCESTER, MASS.

NO UNION NECESSARY!

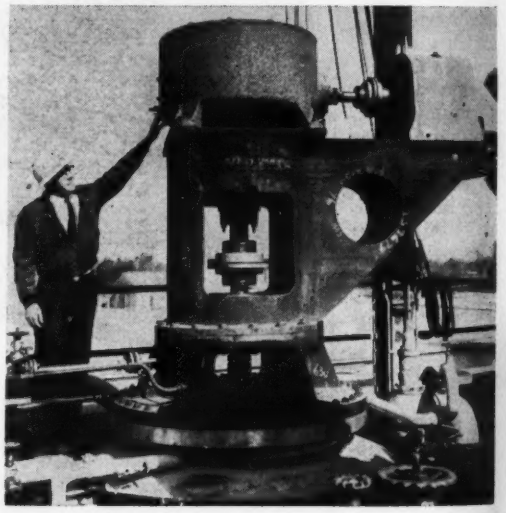
Pechiney-Grace Method Proves Out

Confirmed by successful operation of W. R. Grace Memphis plant during past 2-3 years — during which period plant has run continuously with minimum maintenance, producing a high-quality, oil-free product

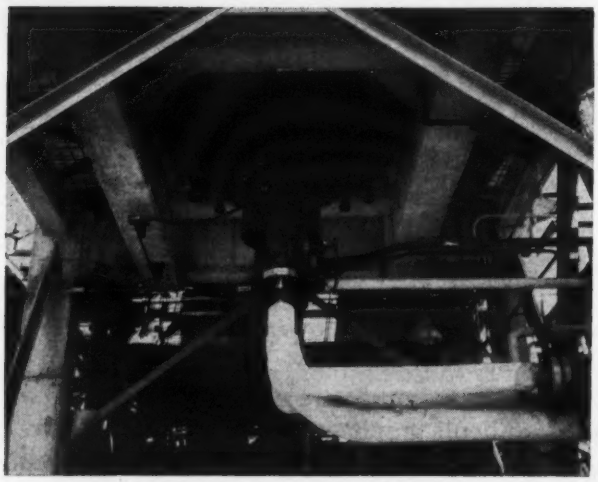
GORDON WEYERMULLER, Petrochemical Editor
with **WILLIAM SMILEY,** Management Staff Engineer
W. R. Grace & Co., Memphis, Tenn.

The Pechiney-Grace urea process, as now used at the W. R. Grace plant in Memphis, is considered by some to be the best total recycle process available. It reached its present stage of successful commercial development at the Grace plant a little more than two years ago. Shortly after that, when decision was made to double size of plant to 300 tons/day, Pechiney-Grace process was considered as best process available for the expansion.

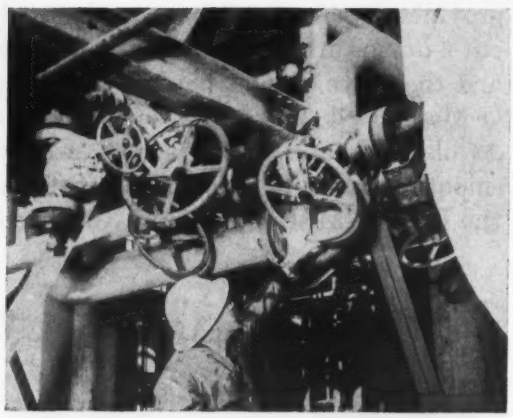
During the past two years or more the plant has operated continuously with only minimum maintenance or downtime. Yields have been high and quality of product excellent. Corrosion problems have been largely eliminated.



Each reactor employs 40-hp drive with special shaft and external bearings that eliminate possible points of crystal accumulation ▶



NH_3, CO_2, and carbamate oil slurry enter bottom of autoclave



Valves on inlet lines to autoclave can be easily spun closed to keep carbamate from backing up and plugging lines ▶

Photos by CP Staff

as Top Total Recycle Urea Process

Only a minimum of power is needed to operate plant. One ton of urea in solution requires 150 kw-hr, with all electric drives. Electrical requirements can be reduced by 50 kw-hr by using steam turbines for several of the large pumps. If this is done, turbine exhaust steam will supply all 50 psig steam required for synthesis as well as that needed for finishing section.

Reason plant is operating so successfully today is due to a number of improvements in plant equipment as well as to the inherently efficient nature of the process.

Autoclaves

Use of oil as a carrier permits an autoclave of simple design. Oil takes up heat liberated due to highly exothermic reaction forming ammonium carbamate from NH_3 and CO_2. It then serves as a heat source for the reaction to urea from ammonium carbamate which is slightly endothermic. Hence, autoclave does not incorporate any external heat transfer surface.

Valves

One improvement in equipment is the inlet valves used for introducing NH_3, CO_2 and carbamate oil slurry to the autoclaves. These valves, shown in one of photos, have been found highly satisfactory for this service.

Valve has Hastelloy alloy C seats, 316 stainless body and uses silver gaskets. Valves operate under 3000 psi pressure. No maintenance is required on these valves between yearly turnarounds. While it took a long persuader to operate valves formerly used here, present valves can be easily spun closed by one man.

Valves are used as stop valves, being last valves in line between process and autoclave. If carbamate backed up, it could plug plant lines.

Reactors

Four 6750-gal aluminum reactors are used. These units employ gas impellers and hood rings, with gas underfeed.

In designing units, the Turbo-Gas-Absorber was studied in pilot scale size for maximum efficiency in absorption and reaction rate and heat transfer within reactor. From this work, present units were built, each of which is 65 times as large.

Units use 40-hp drives with special shaft and drive construction. Bearings are provided externally to support shaft and eliminate any possible points of crystal accumulation and wear within reactor.

Design of present reactors has eliminated problem of incrustation of reactor. Cleaning cycle on external heat exchangers has been lengthened to 45 days, compared to an earlier cleaning cycle of about 14 days.

Evaporator

Another important improvement in process is the use of a Turba-Film processor as the last step in the evaporation of urea in finishing area. In this unit evaporation takes place under 28" Hg vacuum at temperature of 290°F.

Urea has a low residence time in unit of only about 28 sec. Time and temperature promote formation of undesirable biuret. Low residence time in evaporator keeps biuret around 1% in prilled product, well below the 2½% maximum specification. Up to 200 tons per day has been processed through one evaporator.

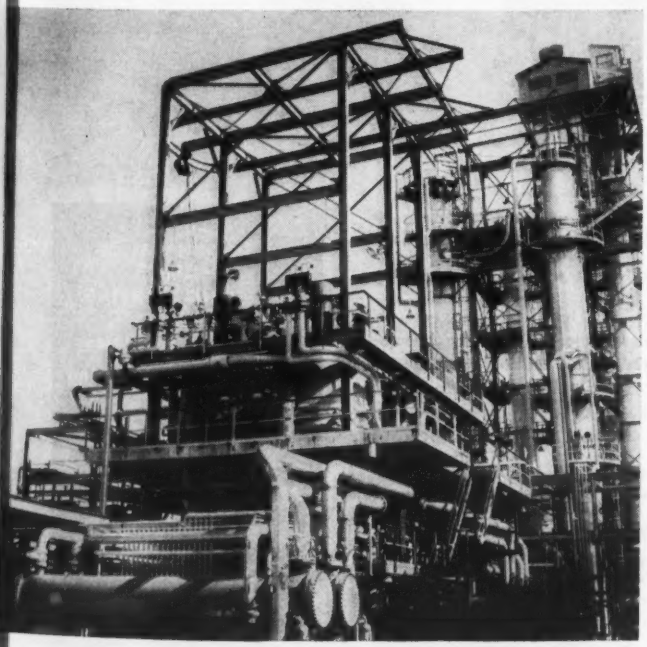
Dehydrator

In finishing area, a Super-D-Hydrator centrifuge is used to separate urea crystals from mother liquor. Crystals enter centrifuge containing about 50% water and leave with about 2½% water, after which they go to dryer.

The centrifuge goes through a cycle of loading, spinning and flushing with demineralized water. Operation of unit is continuous and automatic. This one unit can handle 150 tons of urea per day.

Ammonia Recovery

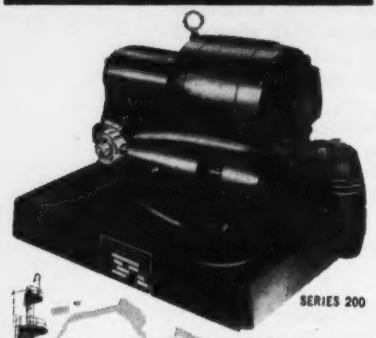
One step added to original process is the ammonia recovery system, which is an important factor in keeping yield high. Vent streams from reactor, flash tanks and other processing points go to absorber for recovery of ammonia, then to stripper for desorption of ammonia, which is returned to synthesis stripper, where CO_2 is added. Unit re-



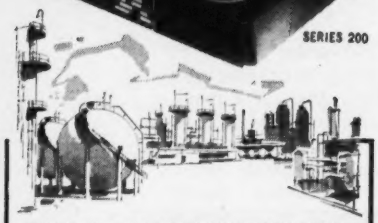
Four 6750-gal aluminum reactors employ gas impellers and hood rings for efficiently distributing incoming gas

ACCURATE CHEMICAL FEEDING

FROM .65 gph TO 1624 gph



SERIES 200



AMERICAN PROPORTIONING PUMPS have repetitive metering accuracy of ± 1% when operating between 10% and 100% of capacity. Feed precisely metered fluids or slurries in all ratios, with controlled process variables.

- interchangeable liquid ends
- spherical self-aligning bearings on crank and crosshead
- crossheads of hardened and ground steel ride on cast iron
- nylon dust covers protect bearings
- NEMA frame motors
- heavy duty reducers

Send for free bulletin.

SERIES 100
Simplex models pump up to 13.10 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

SERIES 200
Simplex models pump up to 812 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

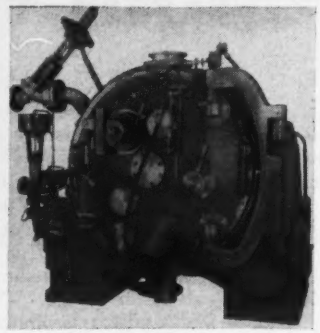
SERIES 100

AMERICAN METER COMPANY
INCORPORATED ESTABLISHED 1874
pump division
13500 PHILMONT AVE., PHILADELPHIA 16, PENN.

Check 2057 opposite last page.

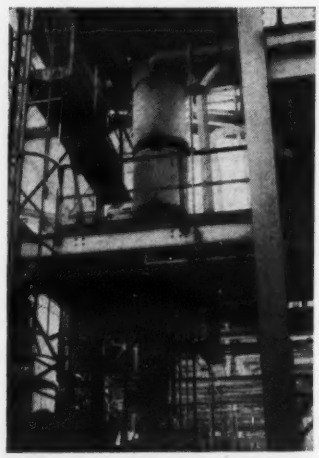
covers about 15 tons of ammonia per day, saving $700 to $1000 per day. Plant has been unable to find any loss of unreacted ammonia.

Memphis plant is practically a monument to aluminum,



Dehydrator centrifuge continuously lowers water content of urea crystals from 50 to 2½%

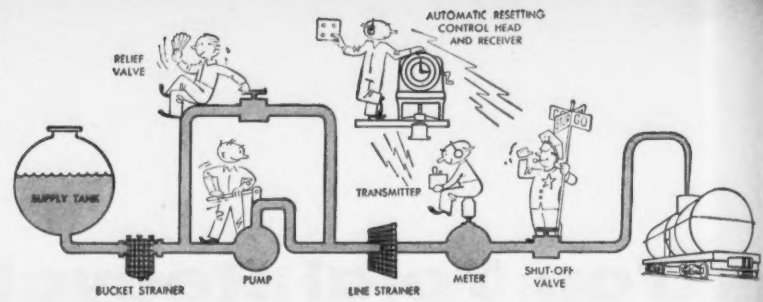
it being used for almost all piping, tanks and other equipment where processing temperatures permit. Carbamate decomposer is now made of aluminum, replacing one made from an alloy. Stainless or Ampco No. 8 alloy is used for 3000 psi service. Where



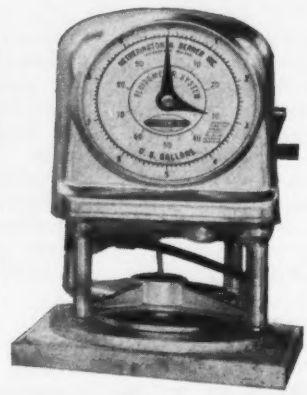
Urea has residence time of only 28 sec in evaporator, limiting formation of undesirable biuret

only NH_3 or CO_2 is being handled, carbon steel is used.

Use of oil and elimination of oxygen have an inhibiting effect on corrosion. Oil slurry recycle method is a major factor in efficiency of process, eliminating necessity of ab-



TYPICAL REMOTE CONTROL FLUIDOMETER SYSTEM



For Use Where Valves Must Be Located In Hard-to-get-to Places

This animated picture illustrates a typical remote control Fluidometer application. Remote control of this general type is recommended when plant conditions or arrangement make direct control impractical or impossible. With a system of this type the Fluidometer control head can be located away from the meter. Shown at the left is the automatic resetting control head, which controls the operation of the shut-off valve to give completely automatic batching. Available either jacketed or unjacketed—"tailor made" to fit your needs. New Bulletin Fl-56 will be sent on request. For information on jacketed pipe and fittings write for Bulletin J-56.

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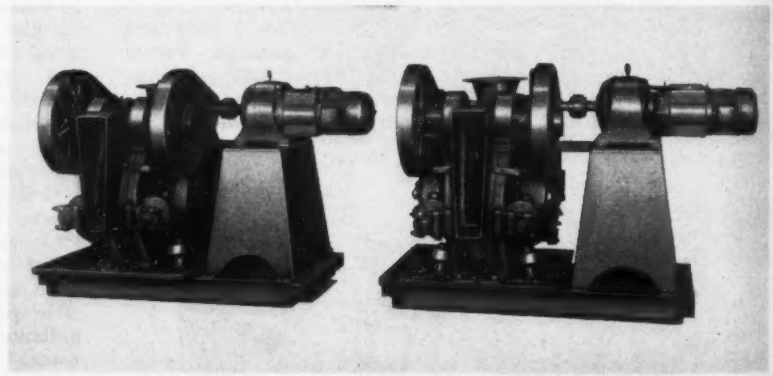
Check 2058 opposite last page.



Two No. 3A DAVENPORT
Continuous Dewatering Presses

These presses will feed two brewers spent grains dryers in a large midwestern brewery. Drives are variable to accurately synchronize output press to the maximum capacity of dryers. This is just one of the many products that DAVENPORT Presses can handle effectively.

Let our engineers consult with you on your Pressing, Drying and Cooling problems or send for our catalog C . For quick reference consult your Chemical Engineering Catalog.

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DAVENPORT
PRESSING — DRYING and COOLING Equipment
Continuous DeWatering Presses
ROTARY DRYERS
Steam Tube, Hot Air and Direct Fire
Atmospheric DRUM DRYERS
ROTARY COOLERS
Water and Air

Check 2059 opposite last page.

sorbents to separate NH_3 from CO_2. Use of oil permits pumps to be used rather than compressors, with savings in capital costs and power.

In spite of oil being used in process, final product has no more oil than urea made by other processes and usually has less. It only contains a few parts per million.

(Pechiney-Grace urea process is licensed by Foster Wheeler Corporation, 666 Fifth Ave., New York 19, N.Y.)

Check 2060 opposite last page.

(Inlet valves to autoclave are product of The Annin Company, 1040 S. Vail Ave., Montebello, Calif.)

Check 2061 opposite last page.

(Aluminum reactors are product of Turbo-Mixer Div., General American Transportation Corporation, 135 S. LaSalle St., Chicago 3, Ill.)

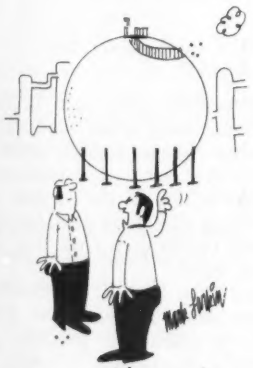
Check 2062 opposite last page.

(Turba-Film processor is product of Rodney Hunt Machine Co., Maple St., Orange, Mass.)

Check 2063 opposite last page.

(Super-D-Hydrator centrifuge is product of The Sharples Corporation, 2300 Westmoreland St., Philadelphia 40, Pa.)

Check 2064 opposite last page.



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MARK LARKIN, ELECTRA MFG. CO.

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B&W *Job-Matched seamless pressure tubing*

B&W offers you . . .

- sound engineering assistance on tubing end-use and fabricating requirements
- mutual understanding toward achieving the most satisfactory and economical tube performance
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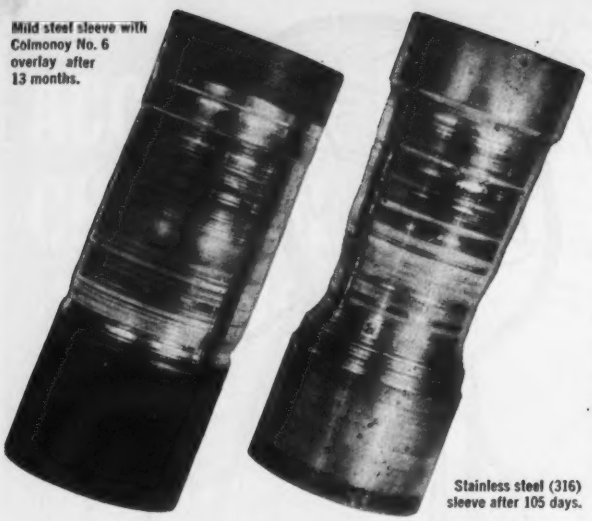
These are just a few of the many reasons why it pays to specify B&W Carbon or Alloy Seamless Pressure Tubing or Pipe. And remember—matching tubes to jobs assures you the *right tube,* in the *right quantity,* at the *right time.* For more information, call your local B&W District Sales Office, or write for Bulletin TB-417. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

TA-9055-SP2

B&W THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

Check 2065 opposite last page.



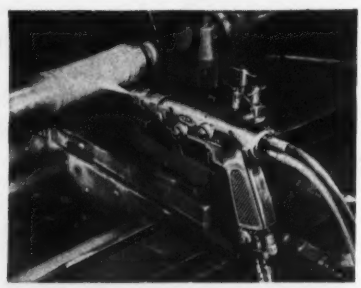
Mild steel sleeve with Colmonoy No. 6 overlay after 13 months.

Stainless steel (316) sleeve after 105 days.

Colmonoy Hard-Surfaced Mild Steel Pump Sleeve Lasts Longer Than Stainless Steel Sleeve

Here's dramatic evidence of how Colmonoy hard-surfacing alloys can lower maintenance costs. Both pump sleeves (above) served in a Desalta charge pump, moving crude oil. The one at the right, made of 316 stainless steel, was photographed after 105 days in service (involving eight packing changes). The other one, made of mild steel with a sprayed overlay of Colmonoy No. 6 alloy, served over three times as long (with just one repacking), yet suffered much less wear.

Colmonoy No. 6 is a wear-resistant nickel-base alloy incorporating chromium borides and carbides. The powdered alloy is sprayed on with the Colmonoy Spraywelder, as shown. The smooth sprayed overlay is then fused to the base metal with an oxy-acetylene flame to form a solid, non-porous, wear-resistant overlay.



WRITE RIGHT NOW
For the Colmonoy Spraywelder Catalog and Hard-Facing Manual No. 79

HARD-SURFACING AND BRAZING ALLOYS

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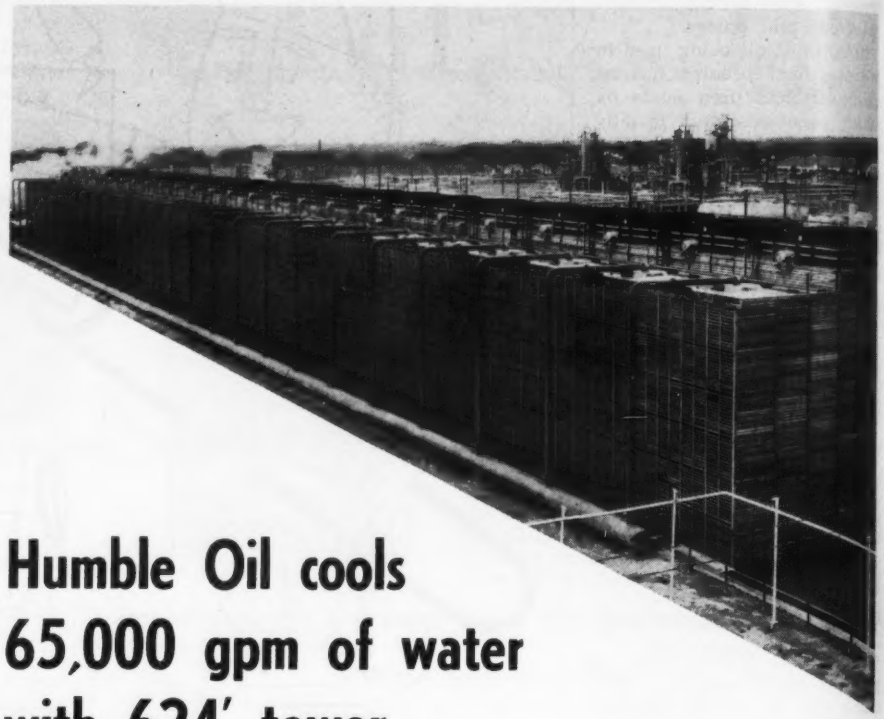
MORRISVILLE, PA. • NEW YORK • PITTSBURGH • MONTREAL • GREAT BRITAIN

Check 2066 opposite last page.



Humble Oil cools 65,000 gpm of water with 624′ tower

Unit supplied in emergency was 30% operative in less than five weeks

GORDON WEYERMULLER,
Petrochemical Editor

PROBLEM: The Baytown, Texas, refinery of Humble Oil Company was faced with a shutdown of process units because of a damaged, partially inoperative cooling tower. Additional cooling capacity was required in as short a time as possible to avoid costly downtime.

Solution: A new cooling tower was built on the foundation of the partially operating tower. It was necessary to modify standard design of tower to conform to existing foundation. It was also necessary to work under the adverse conditions of stepwise removal and replacement of the old tower.

New tower is all-bolted redwood construction except four experimental polyester-glass fiber reinforced plastic fan rings. Three-pass mist eliminator in the tower also has polyester-glass fiber supports. All lumber was pressure-creosote treated except outer shell and stairways.

Cooling tower is one of the largest in the country, being 624′ long and having 26 cells. It cools 65,000 gpm from 115° to 85°F, 80°F wet bulb.

Results: More than 30% of the cooling tower was operative in less than five weeks. Hence, a shutdown because of lack of cooling capacity was averted.

Entire tower has now been in operation about a year and has exceeded performance.

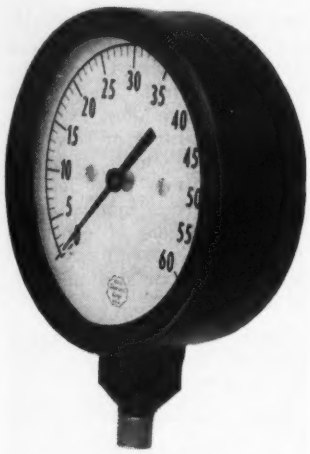
(For further information on cooling tower check 2067 opposite last page.)

Consistent accuracy, long wear furnished by pressure gage

Uses: Unit is suitable for oil, air, water, steam, gas or any media not corrosive to brass or bronze.

Features: Among features that assure long wear and consistent accuracy are bronze-bushed pinion and segment shafts, nickel-silver pinions and stainless hairsprings.

Description: Geared movements mounted directly to socket shank eliminate distortion. Unit uses phosphor-bronze Bourdon tubes with silver-brazed joints. Gage can be installed by hand-turning



Pressure gage is suitable for a variety of products

gage case. Gage is made for 20 ranges for 30″ vacuum up to 1000 psi pressure.

(Gearcoid Gage Type 110 is product of Helicoid Gage Div., American Chain and Cable Co., Inc., Bridgeport 2, Conn.)

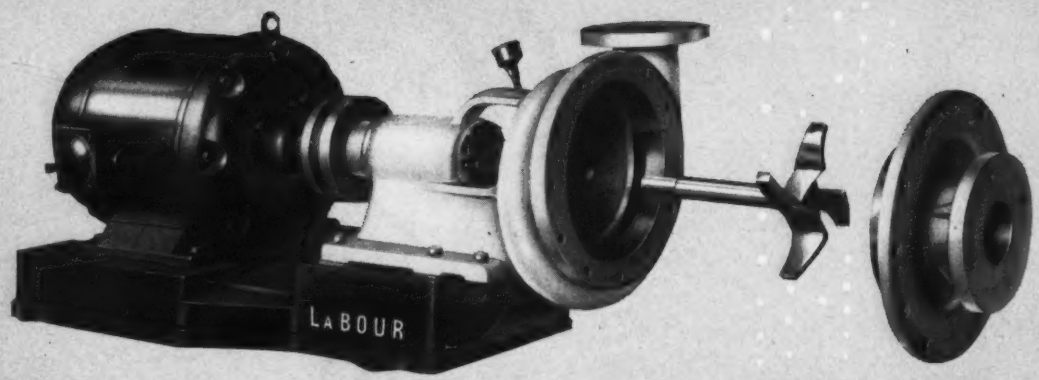
Check 2068 opposite last page.

No danger of distortion with fixed-bearing ball valve

Uses: For operating temperatures from −20 to 400°F and pressures from vacuum to 300 psi.

Features: Ball rotates on fixed axis between bearings that require no lubrication. It can absorb tremendous im-

AIR or VAPOR
—The Factors That Won't Stay Put



Calculating pump pressures and capacities is fairly simple as long as you deal with factors that behave themselves. But when *air* enters the picture you can trade your slide rule for a crystal ball.

Of course a pump isn't supposed to have any air in it, but nevertheless at unpredictable times you get air or vapor in unpredictable quantities. When you do, your nice calculation of volume and specific gravity and viscosity goes out the window. All you can do is *guess*.

You can't escape the fact of air or vapor in what is supposed to be liquid, but you can play safe by specifying LaBour pumps. Even non-priming LaBours can handle air mixed with the liquid, and they do not air-bind in many situations which would make ordinary pumps inoperative. Ask us to give you all the interesting details.

ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

LABOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA, U.S.A.

Check 2069 opposite last page.

accuracy

ASHCROFT DURAGAUGES measure pressure with precise accuracy no matter how severe the conditions of service

Ashcroft Duragauges are available in pressure ranges from 15 psi (or vacuum) minimum to 100,000 psi. Dial sizes: 4½" through 12".

sustained

The Bourdon tube in Ashcroft Duragauges is manufactured to precision standards of flexibility and mono-linked to the rotary movement. When pressure flexes the tube, the gauge pointer is always positively positioned, because it is mounted on the geared center shaft of the movement. Sustained high accuracy and long life are assured.

Choose your Ashcroft Duragauges made of components best suited to your needs. Eight Bourdon tube materials are available. Movement of stainless steel with nylon bearings and pinion gear for longest wear. Case materials: special aluminum alloy or tough phenol plastic.

The unique "Maxisafe®" Duragauge provides absolute protection to the viewer, plus easy and quick access to the mechanism. Your industrial supply distributor will help you select the best combination of components for your Ashcroft Gauge requirements. Phone him today or write for Catalog 300B.

MAXWELL MM&M MANNING & MOORE INC. TRADE MARK

ASHCROFT PRESSURE GAUGES

A product of

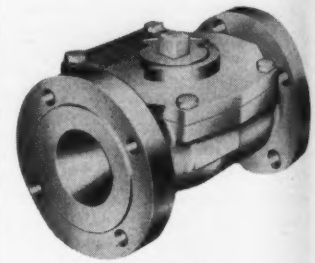
MANNING, MAXWELL & MOORE, INC.

Gauge and Instrument Division • Stratford, Connecticut
In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

Check 2070 opposite last page.

pacts and loading without back-lash or danger of distortion.

Description: Ball valve has replaceable seats. They are balanced, self-aligning and self-adjusting for controlled



Ball valve is available in sizes to 10"

seat loading and positive sealing. Valve can be disassembled without removing it from the line. Sizes from one to ten inches are available.

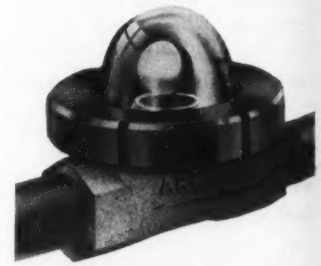
Other features of valve include 100% flow efficiency, two-way flow, zero leakage and low-torque manual operation. Materials of construction includes semi-steel, 316 stainless, carbon steel and aluminum.

(Series 711 Flo-Ball valve is product of Hydromatics, Inc., Livingston, N.J.)

Check 2071 opposite last page.

Ball-type indicator for low flows

Uses: For such applications as air, steam, water and oil purge lines to mechanical seals



Flow makes ball dance in glass dome

— cooling water to compressors, condensers, vessels and other equipment — and lubricating oil to bearings.

Features: Indicator is suitable for very low flows down to 0.075 gpm of water and ½ cfm of air or gas.

Description: Clearly visible from a distance, flow makes ball dance in glass dome. If flow stops, ball drops out of sight. Indicator is made in ½" pipe size for pressures to 100 psi, with bronze body and either nylon or Teflon ball.

(Arkon flow indicator is product of Walker, Crosweller Div., McIntosh Equipment Corp., 15 Park Row, New York 38, N.Y.)

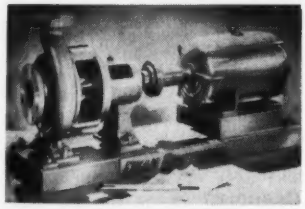
Check 2072 opposite last page.

Chemical process pump available in any of 17 alloys

Uses: For use in chemical, petrochemical and other major liquid processing industries.

Features: A wide variety of corrosives can be handled with pump by proper selection of 17 alloys available for construction of unit.

Description: Centerline suction and discharge simplify



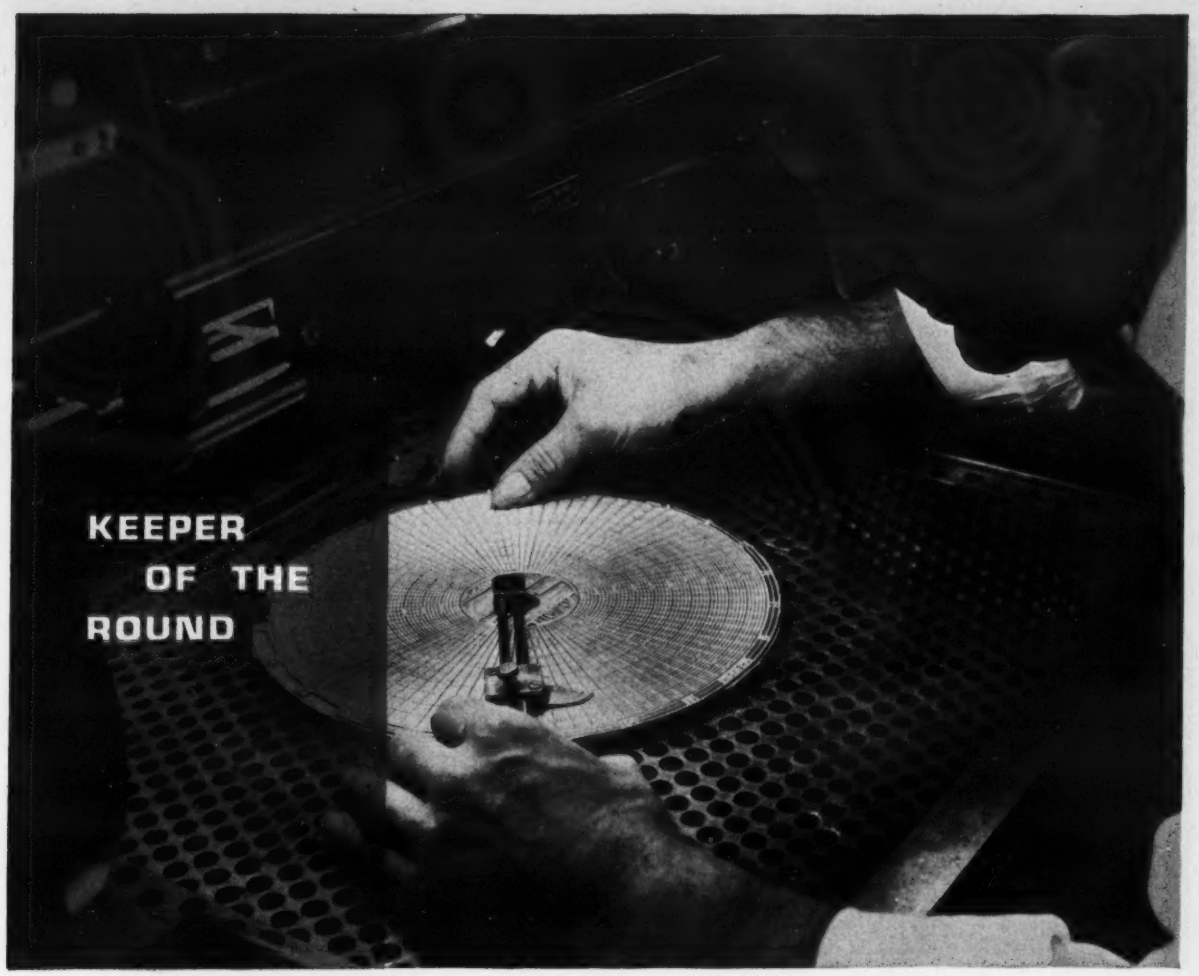
Corrosion-resistant pump can be easily disassembled

piping layout and pump installation. Backhead, bearing housing and rotating assembly can be easily removed.

Full open impeller has smooth, unobstructed inlet passages. Single-piece construction with integral stuffing box prevents misalignment. Pump is designed to permit interchangeable installation of either packing or mechanical seals in field. Unit is available in 14 sizes.

(pH pump is product of Dean Brothers Pumps Inc., 323 West 10th St., Indianapolis, Ind.)

Check 2073 opposite last page.



...he checks and rechecks to insure you
RECORDING CHART PRECISION

Exact, dependable concentricity of all elements is vital to the precision performance of circular recording charts. That's how pressroom supervisor Tony Schifferle gets his *nom de plume* of "Keeper of the Round".

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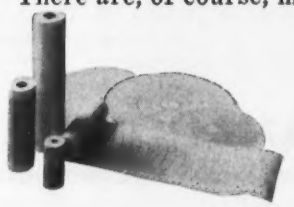
There are, of course, many other important factors to the unerring, dependable accuracy of GC charts whether circular, strip or rectangular.

Special papers produced to rigid specifications and scientifically tested to make sure they meet them exactly. Special formula printing inks and the most modern presses for the economies of high speed, long run production. Humidity controlled throughout manufacturing and storage areas to maintain paper stability.

You can depend on GC Recording Charts for all your needs just as more than 5,000 users are already doing. Over 15,000 different types are carried in stock. Special purpose charts for your individual requirements can be produced skillfully and economically. Write for the GC Stock List and samples.



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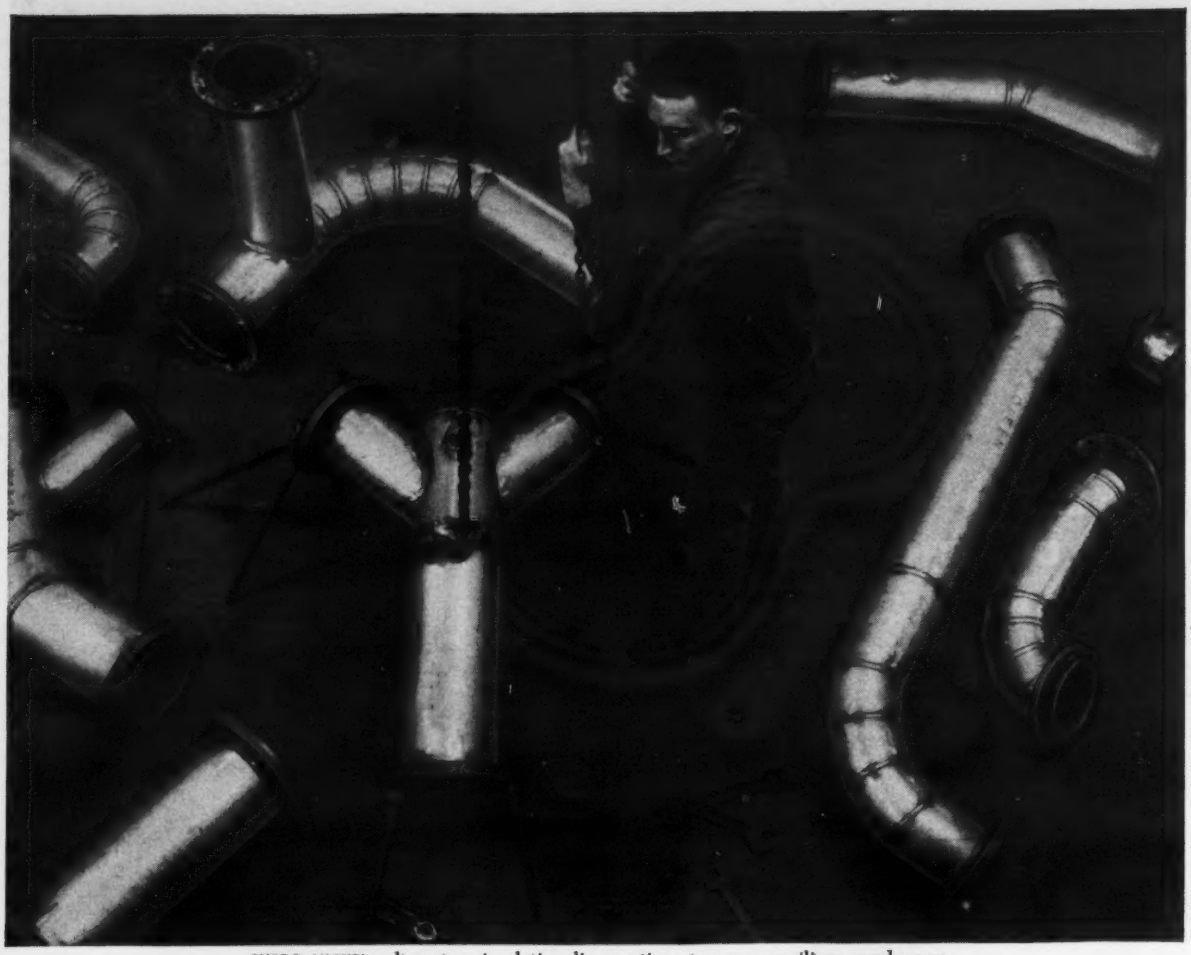
Check 2074 opposite last page.



CUPRO NICKEL salt water circulating line sections to serve auxiliary condensers aboard gypsum rock carriers recently fabricated by Boro Marine & Industrial Corp.

Wide variety of Cupro Nickel piping for salt water lines is readily made from sheet by welding

Circumferential joints are welded manually. Longitudinal seams are welded in mechanized equipment by inert-gas, metal-arc processes.

Ever higher velocities in salt water lines and the growing economic importance of continuity in service, on shipboard, and also in tidewater power plants and oil refineries, are leading to increasing use of Cupro Nickel in piping.

Techniques and skills for economical fabrication of even the most complicated elements of Cupro Nickel piping systems are keeping pace. Boro Marine & Industrial Corp., Port Richmond, Staten Island, N. Y., a specialist in the field, forms piping in sizes 6" to 24" diameter from Anaconda Cupro Nickel stock sheet, usually 48" x 96" x 3/16". Elements shown above indicate the variety possible. Seamless tubing is used for smaller diameters.

Boro Marine fabricates piping from both Cupro Nickel 30%-702 and Cupro Nickel 10%-755. The trend, however, is to Cupro Nickel 10%-755 for the majority of salt water line installations on commercial vessels and in industrial jobs, according to M. E. Wuensch, president. The alloy was developed by Anaconda for this kind of service. It is resistant to corrosion by both clean and polluted sea water, even at relatively high velocity of flow, and is resistant to corrosion by sea water containing air bubbles.

TECHNICAL ASSISTANCE. For help in selecting the alloy best suited for a particular job in heat transfer and piping systems, call in your American Brass representative, or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6006

ANACONDA®
CUPRO NICKEL MILL PRODUCTS
Made by The American Brass Company

Check 2075 opposite last page.

NEW LITERATURE

Petrochemicals

Heat transfer unit for high capacity requirements, which operates on agitated film principle is discussed in four-page bulletin. Diagrammatic view of unit in color is included. Bul 383 — Buflovak Equipment Div., Blaw Knox Company.

Check 2076 opposite last page.

Water-tube package boilers, with built-in controls for operation by either temperature or pressure, are covered in Bul 4010 — Vapor Heating Corporation.

Check 2077 opposite last page.

Saunders patent-type valves, which are pneumatically actuated, are illustrated and detailed in eight-page booklet. Information is included on how to properly select such a valve. Bul HB-7 — Conoflow Corporation.

Check 2078 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Gas-burner nozzle, which provides safe operation with hydrogen or hydrogen-rich gases in various furnaces, is discussed in four-page bulletin. Nozzle can also be used with other gases. Bul 57 — National Airoil Burner Company, Incorporated.

Check 2079 opposite last page.

Centrifugal 40" in size for internal pressure to 150 psi, with capacity to 30 tons per hr, is discussed in bulletin. "HS 40 W Universal" — Chemical Machinery Div., Baker Perkins Inc.

Check 2080 opposite last page.

Submersible pump motors are explained in detail in eight-page, full-color brochure. Exploded and assembled views of the water-lubricated units in color are shown. Form F-2000 — U. S. Electrical Motors Inc.

Check 2081 opposite last page.

Pipesupports, based on use of pre-engineered standard components in a variety of combinations, are discussed in 96-page brochure. Ideas are presented on how money can be saved in engineering and field costs. Cat 59 — Bergen Pipesupport Corporation.

Check 2082 opposite last page.

Pressure-temperature pitfalls can be avoided with . . .

Nucleonic Instrumentation

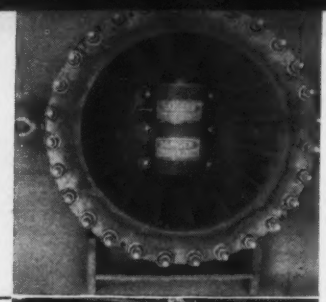
LOUIS J. ROGERS
Head, Electronics & Nucleonics Section
Special Instrumentation Division
Union Carbide Olefins Company
South Charleston, W. Va.

The inherent problems of internal measurement of variables such as liquid level and pressure are sparking interest in external monitoring through the use of radioisotopes. This field of nucleonic instrumentation is receiving quite a bit of attention in the Union Carbide family of companies.

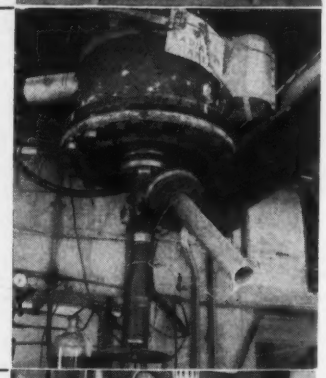
Normally they procure their own instruments from commercial sources. Several manufacturers market catalog equipment which can serve to monitor standard pipelines and vessels of standard configurations. However, in unusual or confidential situations, Special Instrumentation Division is called upon to recommend and/or apply necessary instruments.

The accompanying photographs and diagram illustrate a few such field installations

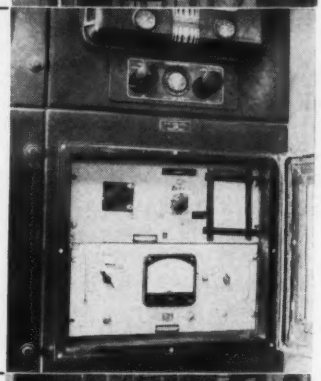
To page 133



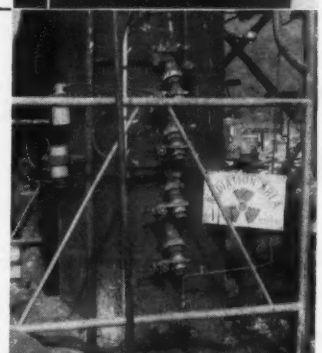
This safety-type cesium-137 holder is attached to single-thickness manhole cover. Such a site is chosen because remainder of vessel is double-walled, containing heat-exchange medium between two walls. (See diagram, below.)



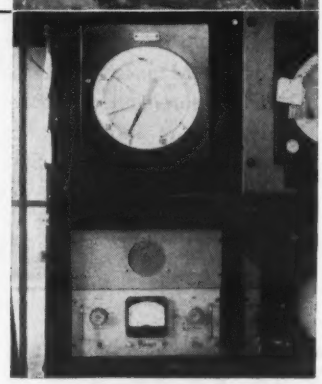
Dual measurement is involved in this project. One source (at right) is used with two receivers connected to switched electrometer input. Path to visible receiver (at left) provides measure of density of vessel contents. Path to second receiver (out of sight at top of vessel) gives liquid-level measurement.



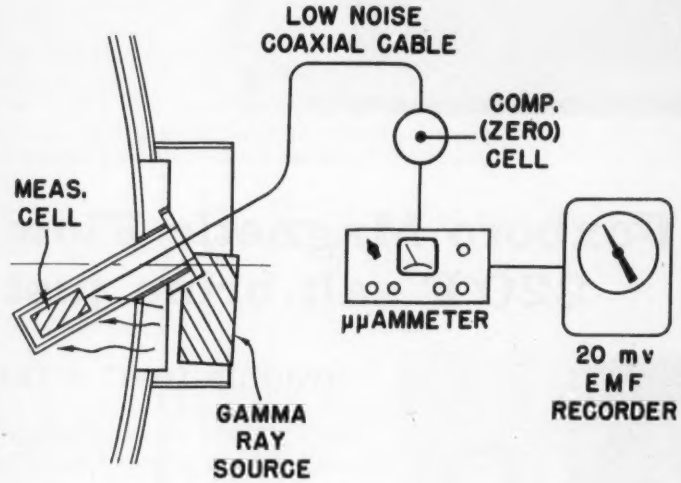
These instruments situated in control room are associated with dual-measurement project discussed above. Upper panel contains both zero cell and auxiliary switch marked with level and density positions, used to connect either of two receivers to electrometer input. Individual range adjustments on upper panel provide calibrations for recorder shown at extreme top of photo.



In this liquid-level measurement across heavy high-walled high-pressure vessel, level of contents near center is determined within approximately one ft. Source unit is situated at right; two receivers are mounted across tank at left. Distance between two receivers is measure of liquid-level height monitored. Note crudeness with which these attachments can be made in field.

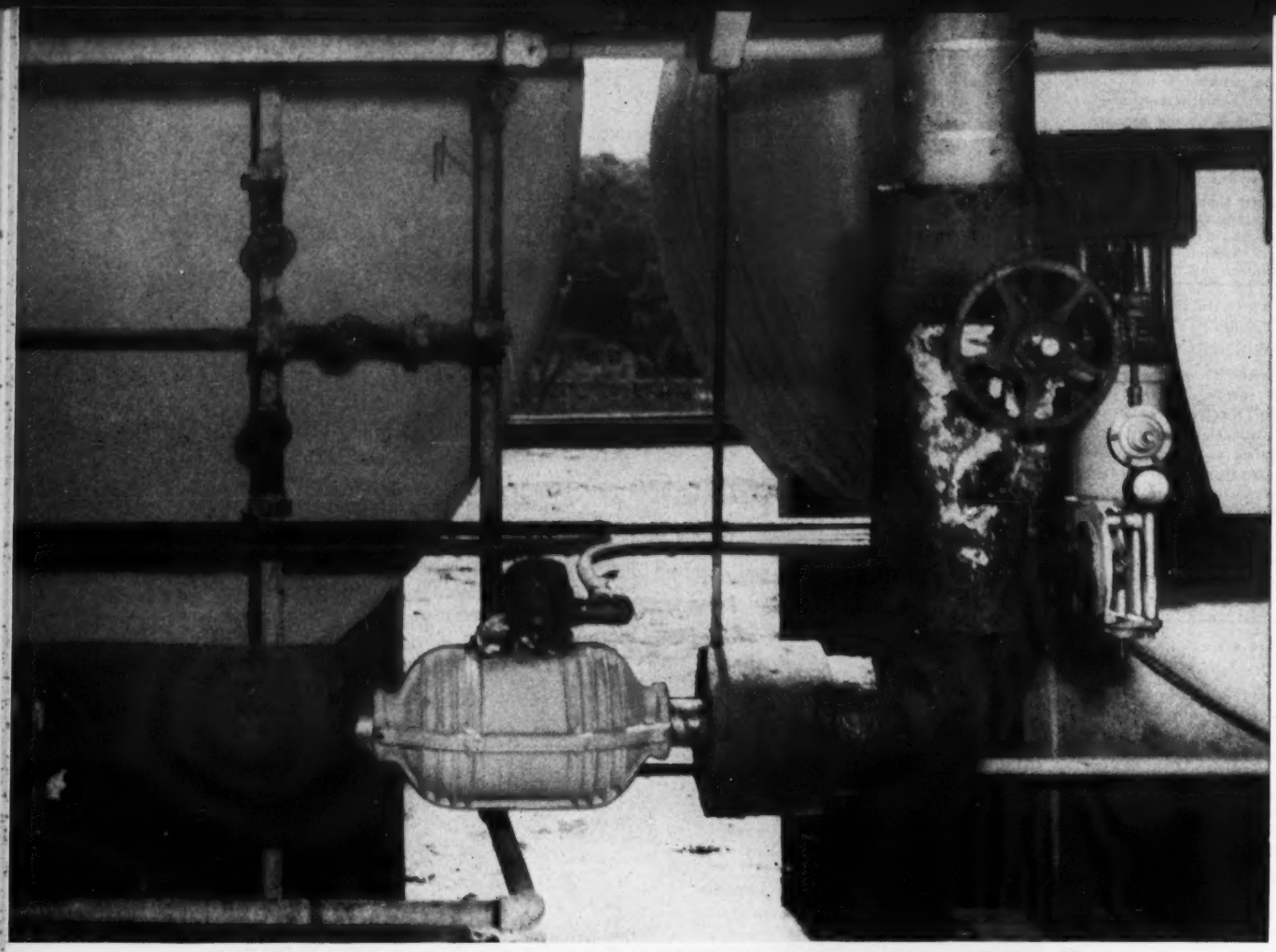


Measuring apparatus pictured here is for set-up described above. Single-channel instrument for liquid-level alone does not include switched inputs.



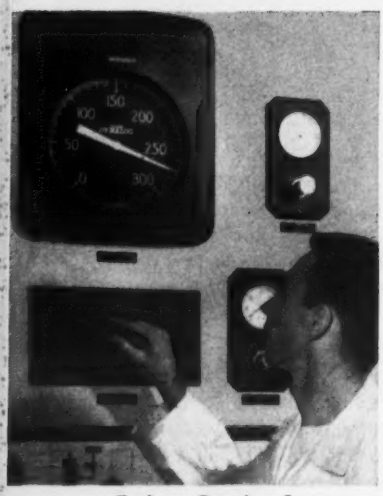
These basic elements are used in measuring variation of density of contents contained within large vessel. Gamma-ray source has been attached to outside of manhole cover on vessel side. Radioactive source of cesium-137 thus irradiates vessel contents. Auxiliary probe finger (inserted into vessel medium) serves as container for measuring cell positioned in front of radiation. In this manner, source-emitted gamma-rays penetrate vessel walls. They pass through fixed distance of measured medium and impinge upon measuring cell.

Coaxial cable connects compensating cell to measuring unit. Differences of measuring-cell-generated currents (due to variations in vessel contents) then flow through μμammeter. This unit amplifies these minute currents to levels suitable for recording by standard potentiometric recorders.



One of six Foxboro Magnetic Meters at International Salt Company's Avery Island Refinery. Meters are measuring 220°F sodium chloride brine being discharged from filters on International's Recrystallizer Process.

Foxboro Magnetic Flow Meters handle 220°F salt brine just like water!



Foxboro Dynalog Instrument indicates flow rate through any one of the 6 Magnetic Meters — at the flip of a switch.

"trouble-free" – International Salt reports

220°F — that's the temperature of sodium chloride brine as it leaves filters at International Salt Company's Avery Island Refinery in Louisiana. And their 6 Foxboro Magnetic Meters have been providing continuous, trouble-free flow measurement of this highly corrosive liquid for over a year.

These meters easily handle this punishing chemical. They're lined with corrosion-proof Kel-F — have no flow restrictions of any type. Linear measurement — accurate to ±1% across the entire scale — is indicated on remote Foxboro Dynalog* instruments.

Since its introduction 5 years ago, the Foxboro Magnetic Meter has simplified the measurement of difficult liquids in hundreds of industrial processes. Ask your nearby Foxboro Field Engineer how it can help your process. Or write for Bulletin 20-14. The Foxboro Company, 815 Neponset Avenue, Foxboro, Massachusetts.

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For more information on product at left, specify 2083 see information request blank opposite last page.

Nucleonics Uses

From page 131

which have been made at Union Carbide. They demonstrate the versatility and simplicity of nucleonic equipment and its application.

During the past several years liquid-level measurements have been made in vessels containing solids, slurries and liquids. These measurements have served to provide both ON-OFF indication and signals calibrated directly in units of height over specified distances. Also, various density measurements have been made—particularly during study of polymerization processes.

Planned Projects

We are currently involved in keeping up with demand for these almost-standard instruments. Also being investigated is measurement of specific gravity in small-diameter tube. We are in close contact with commercial instrument manufacturers who are nearing a solution in this area. Measurements made heretofore have required large instruments and have been on massive structures.

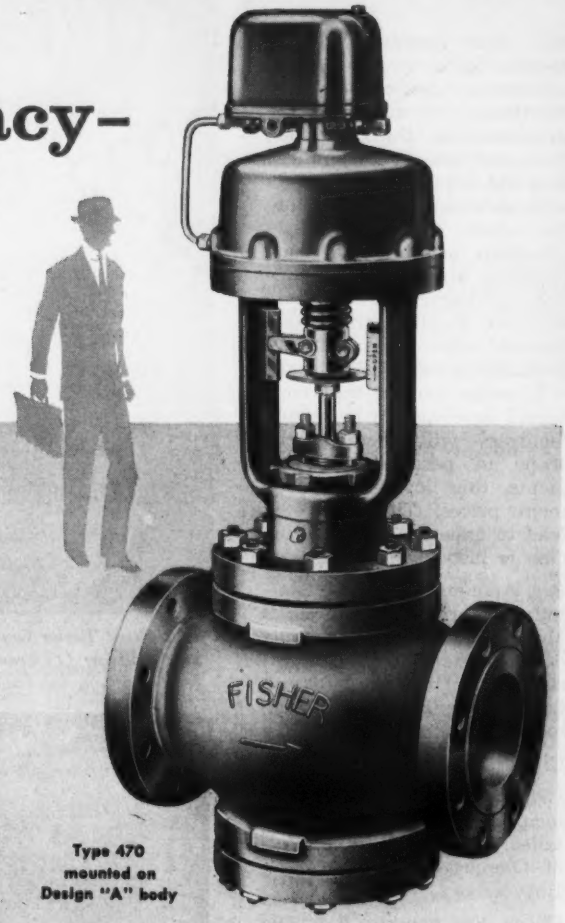
Another area of interest is in isotopic tracing of process streams. These measurements

"Good Heavens, Miss Parker! What did you say in that note to the lab boys?"

YOUR **FISHER/MAN** STANDS BEHIND THIS PNEUMATICALLY OPERATED PISTON...

FOR Inherent Accuracy–Power–Speed and Stability

FISHER TYPE 470 P.O.P.



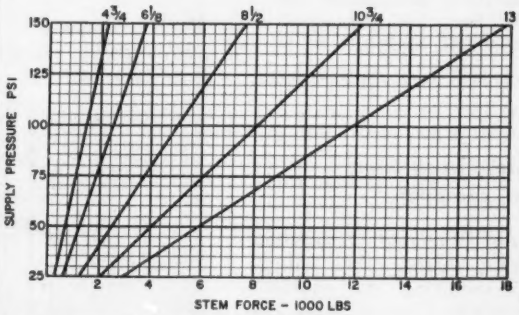
Type 470 mounted on Design "A" body

- **Delivers same power in either direction at any point of the stroke.**
- **Adaptable to virtually all types of valve bodies including Butterfly valves.**
- **No air set required—utilizes clean, non-corrosive air or gas up to 150 psi.**
- **Easily reversible actuator can be changed in the field.**

This small, compact piston actuator incorporates its own positioner mounted integrally on top of the cylinder. Positioner receives any of the normally used pneumatic instrument signals. Then, without an air set, actuator utilizes the full potential of the available instrument or gas supply to provide exceptional speed and power. Series 470 is available in six basic sizes and can be supplied for travel up to 4". Basic actuator can also be furnished with a handjack, hydraulic snubber, pneumatic safety devices or as a spring return unit. Write for Bulletin E-470.

PERFORMANCE DATA

Air Consumption (Static)	20 SCFH at 100 psi supply.
Instrument Signals	3 to 15 psi, 5 to 25 psi, 6 to 30 psi, 12 to 60 psi. Suitable for split range also.
Temperature Limitation	175°F.
Maximum Hysteresis	0.15% of total stroke or instrument signal.
Repeatability	0.03% of the total stroke or instrument signal.
Resolution Sensitivity	Minimum change in the measured variable to produce an effective movement of the final control element is .02% of the instrument pressure range.
Frequency Response	1.4 cps for the Size 60. 4 cps for the Size 30.
Load Sensitivity	Percent of total travel per 100 lbs. stem force is .065% for Size 60.



CYLINDER DIAMETERS AS MARKED ON EACH CURVE.

AVAILABLE STEM FORCE

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD...CHANCES ARE IT'S CONTROLLED BY...

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

BUTTERFLY VALVE DIVISION: CONTINENTAL EQUIPMENT COMPANY, CORAOPOLIS, PA.

FISHER® controls

SINCE 1880

Check 2084 opposite last page.

will be undertaken with a gamma "milker."

There are some obvious drawbacks to nucleonic instrumentation. Such installations involve a high initial cost and introduction of a not-well-understood hazard into the plant. Nevertheless, in situations of abnormal temperature, pressure and material, nucleonics is the only way out. Furthermore certain types of radioelectric cells are intrinsically electrically safe.

It seems certain that continued development by manufacturers will increase the scope of possible measurements, thus lowering instrument prices. This can only lead to expanding use of nucleonic instrumentation.

($\mu\mu$ Ammeter used in installation described in diagram is Model V-2 which is product of Scientific and Process Instruments Division, Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

Check 2085 opposite last page.

(Gamma-ray-measuring cell incorporated in set-up detailed in diagram is product of Ohmart Corporation, 2246 Bogen Ave., Cincinnati, O.)

Check 2086 opposite last page.

(Gamma "milker" referred to in article is product of Tracerlab, Inc., 1601 Trapelo, Waltham 54, Mass.)

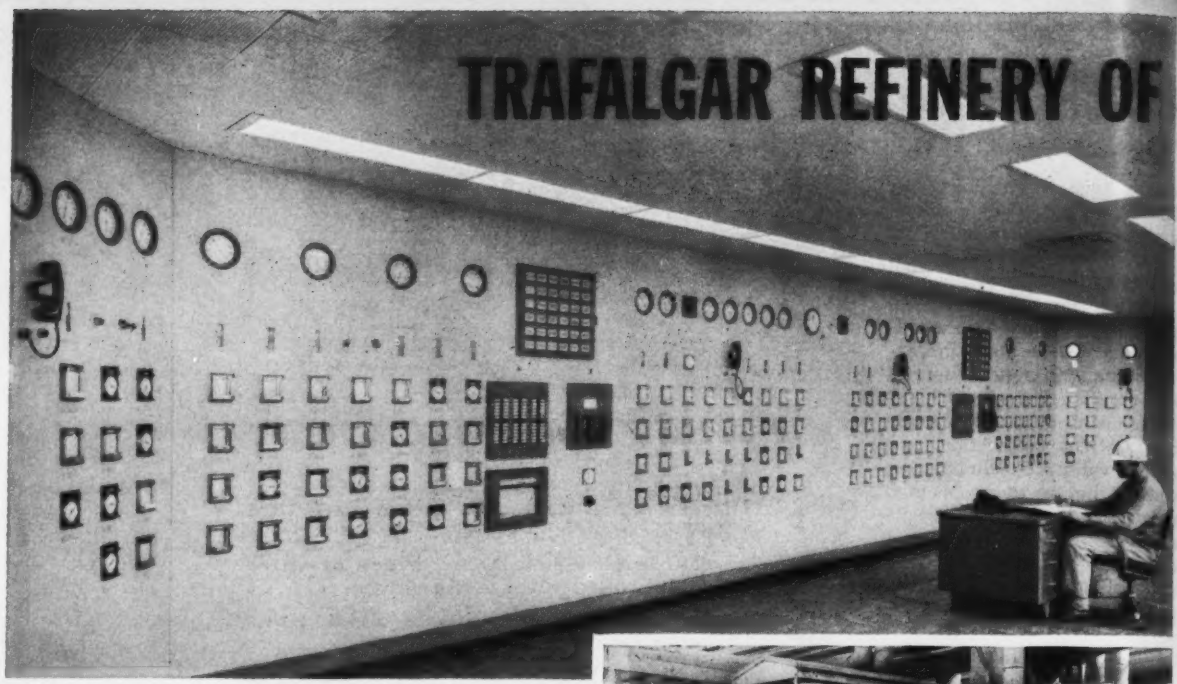
Check 2087 opposite last page.

Remote positioner light, compact

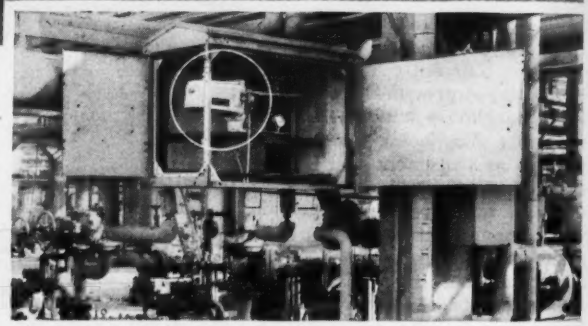
Uses: Pneumatic operation of gate valves, other equipment requiring 180° rotation.

Features: Compact, high operating speed. In largest sizes, clearance less than four inches from valve body. Closing time better than 1/5 second at available pressures. Manual operation permitted in case of power failure, where systems are based on solenoid valves, or air pressure failure. Device can be wired to effect automatic instant opening or closing, according to need, in case of power failure.

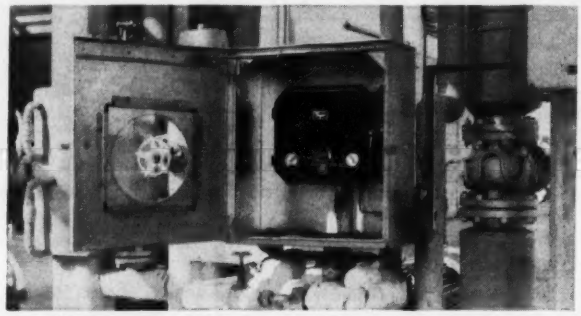
Description: Principle is rack & pinion. Piston is fixed and



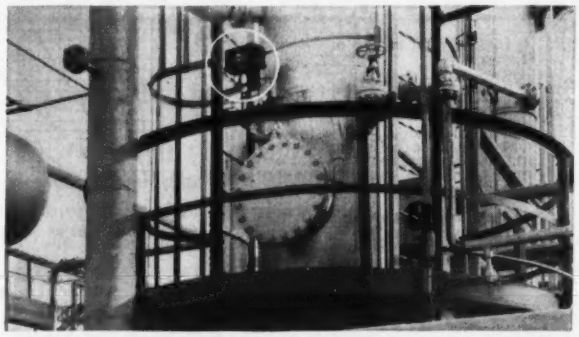
Centralized Taylor Control Panel for the four main process units at Trafalgar: (1) Crude Fractionation, (2) Catalytic Cracking, (3) Gas Plant, (4) Catalytic Reforming.



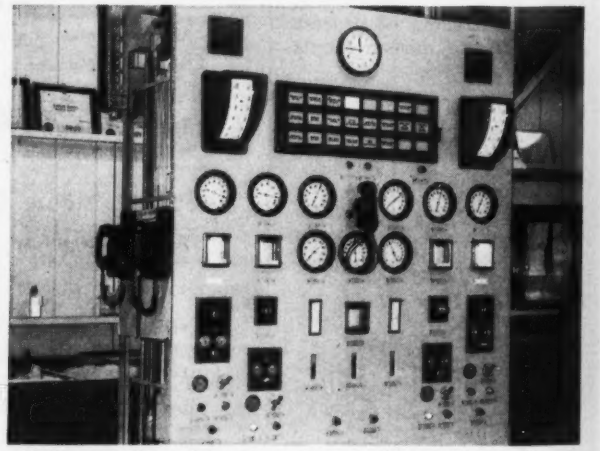
Taylor 333RD Differential Pressure Transmitters used on Catalytic Gasoline Splitter Feed.



Taylor Boiler Feed Water Pressure Transmitters — one of many applications.



TRANSAIRE Temperature Transmitter — installed on Catalytic Gasoline Splitter column bottoms.*



Utility control panel for power plant at the Trafalgar refinery.

*Reg. U.S. Pat. Off.

Taylor Instruments

CITIES SERVICE REFINING (CANADA) LTD.

INSTRUMENTED ENTIRELY BY *Taylor*

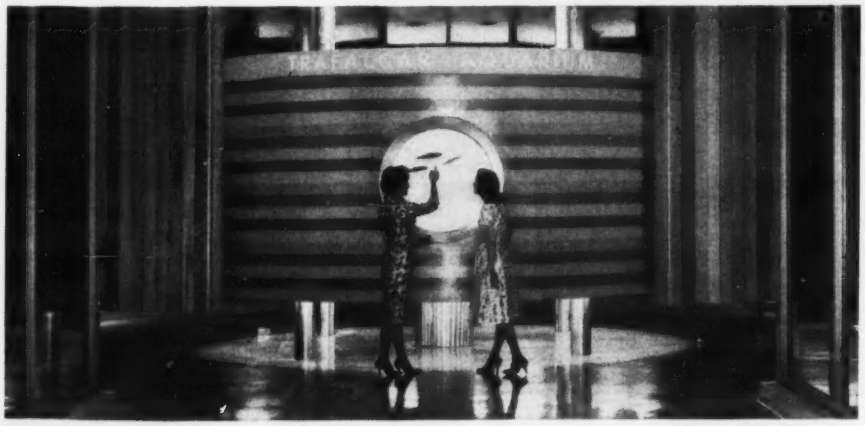
Located at Bronte, Ontario, the 20,000 bpsd Trafalgar Refinery is one of Canada's newest and most practical. Designed and built by C F Braun & Co of Canada Ltd., it is a completely integrated refinery, processing a blended Canadian crude originating in Alberta, Saskatchewan and Manitoba. Refined products include several grades of motor gasoline, aviation gasoline, jet fuels, fuel oils and liquefied petroleum gases.

Transmitters, receivers, controllers and panel boards throughout this modern refinery were supplied by Taylor Instrument Companies of Canada, Ltd., working in close cooperation with Cities Service and Braun engineers. Such a highly integrated plant layout demands the utmost instrument dependability, and we are proud of the fact that Taylor's reputation merited this responsibility. Also that our Canadian subsidiary could supply the wide range of instruments needed to control all the variables involved in the diverse processing requirements of this complex refinery.

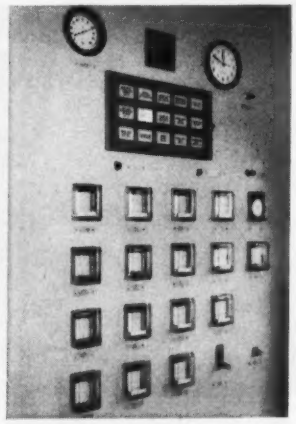
• • •

Taylor subsidiaries are also located in England, Australia, West Germany, with facilities to serve your foreign operations. Call your Taylor Field Engineer, or write Taylor Instrument Companies, Rochester, New York, or Toronto, Ontario.

Lake Ontario fish thrive in Trafalgar Refinery's waste water.



This 6,000 gallon aquarium is supplied with effluent water actually more pure than originally drawn from the lake. The water treatment plant is reputed to be the most efficient ever installed in a refinery.



The Taylor control panel for the Trafalgar water treatment plant.

MEAN ACCURACY FIRST

Check 2088 opposite last page.

cylinder carries rack. Air moves cylinder to turn pinion gear mounted on valve stem. Design permits operator to read position of gate at valve location, or remote indicators may be installed. Air pressure as low as 50 psi can be employed.

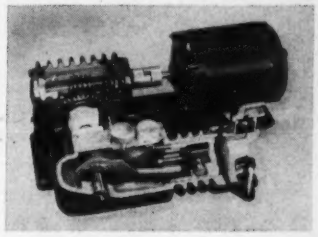
(Remote valve operator is product of Vacuum Research Company, 420 Market St., San Francisco 11, Calif.)

Check 2089 opposite last page.

Metering pump welcomes viscous liquids and slurries

Uses: Metering-pump applications, particularly with slurries and viscous liquids.

Features: Pump is designed for durability. All moving parts are run in an oil; no lubrication is needed. All gearing and drive unit has machined cut teeth. Pump drive shaft has two outboard as well as two inboard bearings. Drive shaft from motor runs in self-oiled timken bearings. Massive piston and connecting rod resemble those of diesel engine. Piston has only short 9/32" stroke, is driven by eccentric with broad 1⅞" face.



Metering pump is available in four standard sizes with capacities in range of zero to 10, 18, 36 or 54 gph for pressures to 300 psi

Description: Metering pump is available in four standard sizes. With capacities ranging zero to 10, 18, 36, or 54 gph, for pressures to 300 psi. Duplex pumps are available which double these capacities without increasing motor size.

(Metriflow pump is product of The Madden Corporation, 1345 Jarvis St., Chicago, Ill.)

Check 2090 opposite last page.

SERIES 40 GOBBLES UP EXTRA HEAVY CONDENSATE LOADS

This "thirsty" Yarway Impulse Steam Trap gives you all the well-known Yarway advantages like *quick heat-up, even temperatures, small size, good for all pressures, non-freezing*—PLUS the added feature of *huge capacity.*

For example, at 100 psig the ¾" size will handle 5600 lbs/hr; the 2½" size, 62,000 lbs/hr.

Specify the Yarway Series 40 Trap for applications on large autoclaves, cooking kettles, heat exchangers, heating coils and other places where loads are heavy.

Buy the Yarway Series 40 from your nearby Industrial Distributor—more than 270 stock and sell the Yarway line. Over 1,250,000 Yarway Impulse Steam Traps already sold.

YARNALL-WARING COMPANY
100 Mermaid Ave., Philadelphia 18, Pa.

SERIES 60—normal needs, pressures to 400 psi, 6 sizes. **SERIES 120**—normal needs, pressures to 600 psi, 6 sizes. **SERIES 40**—for extra heavy loads, 5 sizes. **NO. 30**—for extra light loads (½" only). **INTEGRAL STRAINER**—highest pressures and marine use, 6 sizes.

YARWAY | *impulse® steam traps*

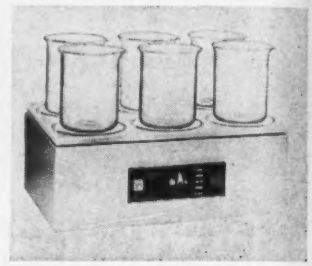
Check 2091 opposite last page.

Mixes, stirs six vessels all simultaneously

Uses: Stirring and mixing solutions.

Features: Stirrer can mix and stir solutions in up to six vessels simultaneously at same speeds.

Description: Magnetic stirrer is of single-unit construction. It is fabricated of heavy gage aluminum and will handle vessels of up to 1000 ml capacity. Unit measures 18 x 12 x 7". It has 1/20 hp motor, lubricated for life, and Ohmite rheostat.



Vessels up to 6" in diam and up to 1000 ml in capacity can be handled by magnetic stirrer

(Multi-Magnestir is product of Labline, Inc., 3070 W. Grand Ave., Chicago 22, Ill.)

Check 2092 opposite last page.

Ultraviolet analysis in 220 to 770 μ range

Uses: Ultraviolet analysis in 220 to 770 μ wavelength range.

Features: Spectrophotometer achieves true double-beam operation through use of vibrating mirror assembly. This alternately directs monochromatic beam through sample and reference.

Description: Direct-reading double-beam ultraviolet spectrophotometer incorporates direct readout meter system for manual operation. Reading directly in absorbance and percent transmission, can be converted to true percent transmission recording instrument by addition of wavelength drive accessory and potentiometric recorder.

In performing quantitative analyses, desired wavelength is selected, sample reference

inserted, and meter read. Separate readings for reference and sample beams are unnecessary.

Resolution in ultraviolet range is said to be better than 1.2 μ and in visible range better than 4.0 μ. Stability of 100% line is reportedly better than $\pm$ 2.0% from 220 to 700 μ. Reproducibility is over $\pm$ 1.0% over T, while photometric repeatability is better than 0.5%T.

(DB Ultraviolet spectrophotometer is product of Scientific and Process Instruments Division, Beckman Instruments Incorporated, 2500 Fullerton Ave., Fullerton, Calif.)

Check 2093 opposite last page.

COMING IN JULY

A top example of what can be accomplished through close customer/equipment supplier teamwork is the story on how Du Pont went about streamlining neoprene bagging and palletizing in its Louisville Works. Coming out of the program: Saving of 50,000 manhours/year; New automatic bag palletizer. Read about it in July Chemical Processing.

Liquids not needed in determining volumes of solids

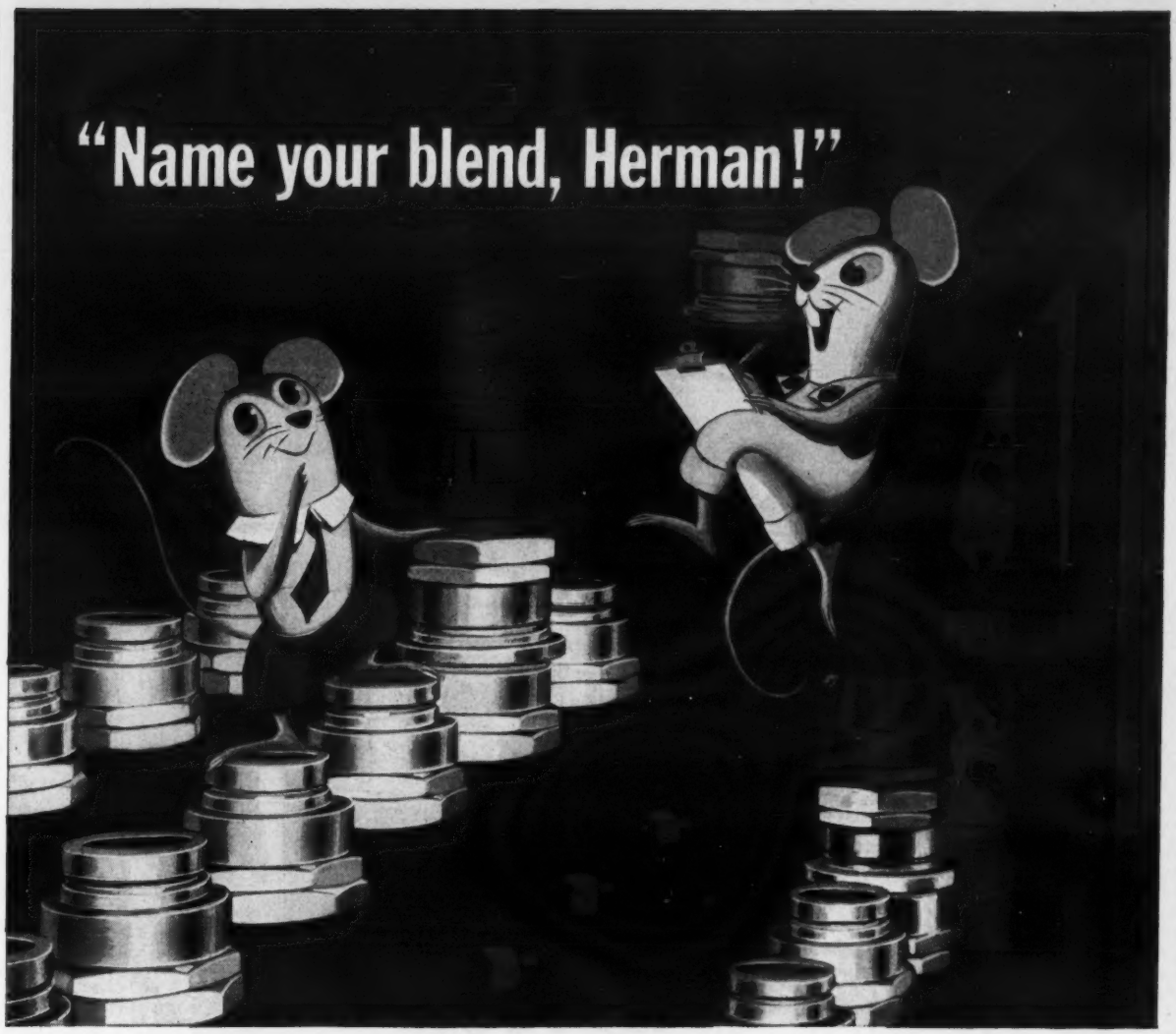
Direct digital indication of true volume

Uses: Determination of true volume of granular irregular or porous solids.

Features: Device permits true-volume determination of solids without use of liquids.

Description: Pycnometer is based on principle that two closed systems of air at same pressure and temperature will have identical specific volumes. Unit permits direct digital indication of true or absolute volume of any solid substance with only one-minute procedure.

Instrument incorporates two identical equal volume chambers stroked by pistons



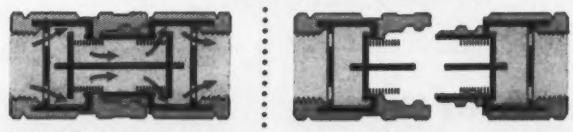
Here's the new, easy way to blend fluids: with Snap-Tite valved couplings on flexible lines

Now there's no need to laboriously open and close a lot of shut-off valves when you're blending petroleum products or other chemical fluids. With Snap-Tite valved couplings on flexible lines you can quickly switch hoses to any base stock line as required. Mixing is faster: you can perform more operations at one time . . . with no danger of contamination of base stocks by interflow through leaky valves! Valves with Snap-Tite couplings instantly shut off the flow when disconnected, and prevent run-out from overhead lines.

Under this arrangement, you store only base stocks to achieve infinite variations in blending. Not only do you save space, time and labor, but by eliminating shut-off valves and associated headers and permanent piping, you save substantially on equipment. In a recent installation (Standard Oil at Richmond, Cal.) the coupling cost was approximately one-third that of permanent piping!

For information, write for Snap-Tite Catalog No. 59. Ask for the name of your local Snap-Tite representative. There is no obligation.

TO USE SNAP-TITE VALVED COUPLING:



CONNECT—Full flow instantly DISCONNECT—Stop flow instantly

Snap-tite

ST-59-05 UNION CITY, PA.

Check 2094 opposite last page.

through fixed distance. Third cylinder is connected to one of two cylinders of equal volume. This has calibrated stroke, so that for any movement of piston a counter registers proportionate volume displaced.

In operation, sample material is inserted in sample container, crank is turned until forcefully stopped, second crank is turned until gauge reads zero and volume is read directly from digit readout in terms of either cc or cu in.

(Air-operated pycnometer 200 is product of Houston Instrument Corporation, PO Box 22234, Houston 27, Texas.)

Check 2095 opposite last page.

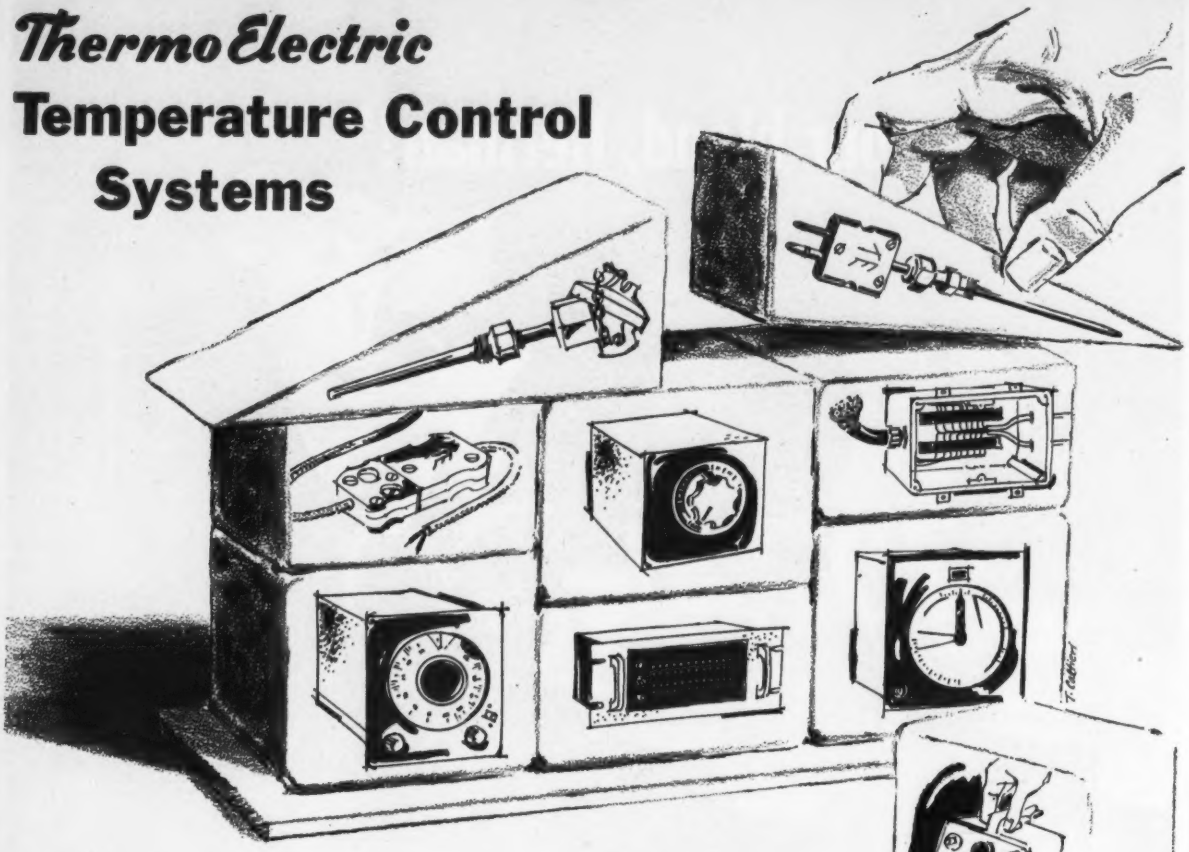
Analog signals compressed into digital data

Uses: Compresses an input of analog voltage data into a computer compatible digital magnetic tape recording of only significant data.

Features: Input can be direct from any number of channels, or from analog magnetic tape recording. System recognizes and digitizes only during defined voltage peaks, bands, or zones which are established by mathematical criteria. System takes unique approach to analog-to-digital conversion by digitizing the data before the system performs its other functions. This eliminates inaccuracies or ambiguities typical of analog data. Maximum of 10,000 samples per second can be digitized with accuracy. Any existing library of analog data can be translated and edited by system, resulting in less storage space and significant time savings in computer programming and operation.

Description: Modular system consists of three separate but matching cabinets: Digital control circuitry; buffer memory, digitizer and display, and magnetic tape unit. Solid-state, plug-in-circuit boards facilitate adapting system to user's needs. A magnetic core buffer storage holds analog signals to allow time for digi-

ThermoElectric
Temperature Control Systems



Custom Designed **—for YOU!**

Thermo Electric advanced systems-building components permit custom designing to satisfy your temperature monitoring, indicating, recording, or controlling requirements, exactly and economically. Starting with T. E. thermocouples—standard or special calibrations—from 1 inch to 66 feet and longer, accessories are carefully selected by T. E. applications engineers to relay any number of signals to your instrument panel. Quick-coupling plug and jack connectors and panels, extension wire and cable are precisely matched to eliminate false emf's. Junction boxes, rotary, key or push-button selector switches are all designed and constructed by T. E. to the highest quality standards.

To monitor, indicate, record or control process variables, T. E. offers the compact Signaling Controller—the Indicating Controller and Indicating Recorder with large, easily-read scales, or special multi-point monitor systems. All instruments have front-set controls, complete in-the-field range interchangeability, ease of service, and feature the new High Gain Relay or Servo Amplifiers with high sensitivity and exceptional stability.

The portable "MiniMite" Indicator with 23" scale and 0.25% scale accuracy, can be used to indicate on-the-spot temperature or for calibration and test work.

Let us assist in building your process control system.

Send application details on your letterhead today to Dept. 5

ThermoElectric CO., INC. SADDLE BROOK, NEW JERSEY

In Canada: THERMO ELECTRIC (Canada) LTD., Brampton, Ontario

tizing and to make possible uninterrupted synchronized flow of digital data, even though input of analog may vary. Time reference information and measurement identification codes added to the tape during the analog phase make easy reconstruction of signals in such manner that data can be treated mathematically as though all channels were instantaneously and simultaneously sampled at a defined time and interval.

(CSC High-Speed Translator-Editor System is product of Consolidated Systems Corporation, Div., Consolidated Electrodynamics Corp., Monrovia, Calif.)

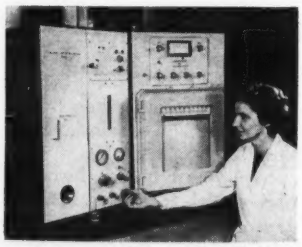
Check 2096 opposite last page.

Vapor fractometer has ionization detectors, Golay columns

Uses: Vapor-fractometer applications.

Features: Unit incorporates latest developments including Golay columns and ionization detectors.

Description: Vapor fractometer incorporates potential of Golay capillary column by flame and beta-ray ionization



Vapor fractometer incorporates Golay columns and ionization detectors

detectors. These permit accurate measurement of sample components in the minute quantities resolved by Golay column. Standard interchangeable packed columns and thermistor hot-wire detectors are available.

(Vapor Fractometer 154-D is product of Perkin-Elmer Corporation, Norwalk, Conn.)

Check 2097 opposite last page.

introducing the new # 277

MOISTURE TELLER

BY DIETERT-DETROIT

NEW LOW COST
NEW COMPACT STYLING

The all new No. 277 Moisture Teller reaches a preset drying temperature faster than any similar unit in its field today. It is designed for intermittent duty where fast drying is important. The combination of fast heating and high static pressure from a high speed blower represents an important step toward faster moisture determination.

Dietert Moisture Tellers *remove all of the moisture* from the sample to make the analysis absolute. No calibration or reference to standards is required.

Equipped with an adjustable thermostatic regulator and armored thermometer. Drying temperatures controlled within 2 to 7 degrees of selected temperature.

EXAMPLES OF SPECIFIC TESTS USING DIETERT MOISTURE TELLERS

Sample	Sample Size	Temperature Degs. F.	Drying Time Minutes
Sand	50 gms.	250	3
Coarse Salt	20 gms.	260	6
Soap Powder	10 gms.	250	9
Color Pigment	10 gms.	212	12
Liquid Wax	5 gms.	250	15
Yeast	50 gms.	280	15
Licorice Extract	5 gms.	220	30
Pig Meal	25 gms.	250	25
Mash Pellets	25 gms.	255	25
Pulverized Oats	25 gms.	255	10
Glass Powder	10 gms.	250	20
Fine Salt	20 gms.	260	7
Soap Flakes	10 gms.	250	8
Flour	25 gms.	250	12

DIETERT DETROIT

HARRY W. DIETERT CO.
9330 Roselawn
DETROIT 4, MICHIGAN

Send me complete details on the New No. 277 Moisture Teller.

Name_____

Company_____

Address_____

City_____ State_____

Check 2098 opposite last page.

IN YOUR PLANT...

STOP THESE 10 LOSSES WITH NEPTUNE *liquid* METERS

1

STOP SPOILED BATCHES Get automatic formula control with Auto-Stop meters.

2

STOP WAITING for liquids to creep up to gauge mark. Let the meter do it!

3

STOP MANPOWER LOSS hauling buckets or bags. Meters do the measuring while pumps do the work.

4

STOP GIVING AWAY INGREDIENTS by over-measurement just to be sure.

5

STOP BACK CHARGES for rejects. Meters save customers.

6

STOP GUESSING COSTS. With meters you always *know.*

7

STOP HAZARDS of spilled inflammables or messy liquids. Meters keep 'em in the pipe.

8

STOP RECEIPT LOSSES. Meters *prove* any shortages.

9

STOP SHIPPING LOSSES Meter - printed tickets give proof of honest delivery from your plant.

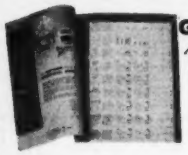
10

STOP CONTAMINATION of liquids...use Neptune Stainless meters.

METERING DOESN'T COST...IT PAYS BY MAKING THESE 10 SAVINGS REGULARLY IN YOUR PLANT.

NEPTUNE DOES ALL THESE THINGS FOR YOU:

- Cuts off flow at preset quantity
- "Memorizes" formulas of repeated batches
- Prints batch tickets showing amount delivered
- Controls pumps electrically
- Measures over 150 liquids...water, oils, syrups, brines, soaps, chemicals, etc.



GET THE FACTS
Ask for helpful Meter Data Bulletin 566 X P. See Neptune Data Pages in Chemical Engineering Catalog.

NEPTUNE METER COMPANY
19 West 50th Street • New York 20, N.Y.

neptune

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SAN FRANCISCO (Millbrae)
IN CANADA: TORONTO 14, ONT.

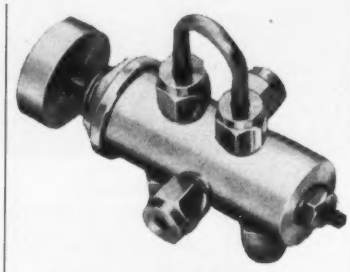
Check 2099 opposite last page.

Gas-sampling valves have holdup volumes less than 0.1 ml

Uses: Injection of precise volumes into standard gas-chromatography units.

Features: Holdup volumes are less than 0.1 ml.

Description: Six-way gas-sampling valves are available



Six-way gas-sampling valves are designed to work with any standard gas-chromatography unit

in five models—four panel mount units, nut and tube type, and heated valve allowing injection of compounds with boiling points to 250°C. Spindles are fitted with five silicone rubber "O" rings. Reproducibility is 0.1%, operating temperature to 200°F.

(Six-way gas sampling valves are product of Wilkens Instrument & Research, Inc., PO Box 313, Walnut Creek, California.)

Check 2100 opposite last page.

Material-level indication in hazardous areas

Uses: Material-level indication.

Features: Units are available for general-purpose applications as well as for use on hazardous dust locations (Class 2, Groups E, F and G).

Description: Material-level indicators available for general-purpose applications (SG-4) contain gasket between cover and body. Models for hazardous dust locations (SG-4X) have metal to metal surfaces and paddle-shaft bushing machined to UL specifications.

In operation, sensing paddle, located at desired material level, is rotated by

PALMER

presents

an outstanding improvement in

DIAL THERMOMETERS

external calibration

Full 3½" Dial Face

- No Sector
- No Pinion
- No Linkage
- Constant Accuracy
- Easy Readability

WRITE FOR BULLETIN 350

PALMER
THERMOMETERS, INC.
Norwood Ave., Cincinnati 12, Ohio
Mfrs. of Industrial Laboratory Recording and Dial Thermometers

Check 2101 opposite last page.

shaded-pole induction motor in casing outside bin or silo. When material restrains paddle from turning, motor and mounting revolve around drive shaft actuating two switches mounted in base of indicator.

Material falls away from paddle, adjustable tension spring returns motor and frame to initial position. This releases switches and causes motor to turn paddle again. For high-level indication or control, motor runs continuously until rotation of paddle is interrupted or resisted by rising level of material. In low-level indication or control, the opposite is true.

(Material-level indicator SG-4 and SG-4X are products of Fuller Co., Catasauqua, Pa.)

Check 2102 opposite last page.

Timed automatic control of temp or presssure

Uses: Timed automatic regulation of either temperature or pressure in batch-type operations.

Features: Charts and ranges are available as low as −100° F or 30″ of mercury vacuum and as high as 1000°F or 7500 psig.

Description: Elapsed-timed controller has pneumatic control signal. It is activated by external start button. As measured variable approaches control point, timed phase of cycle begins — indicated by green signal light. When preset timed period has elapsed, both lights go out, controller automatically shuts down, and timer resets and is ready for repeat cycle. Another arrangement available permits starting timed period immediately with pressing of start button.

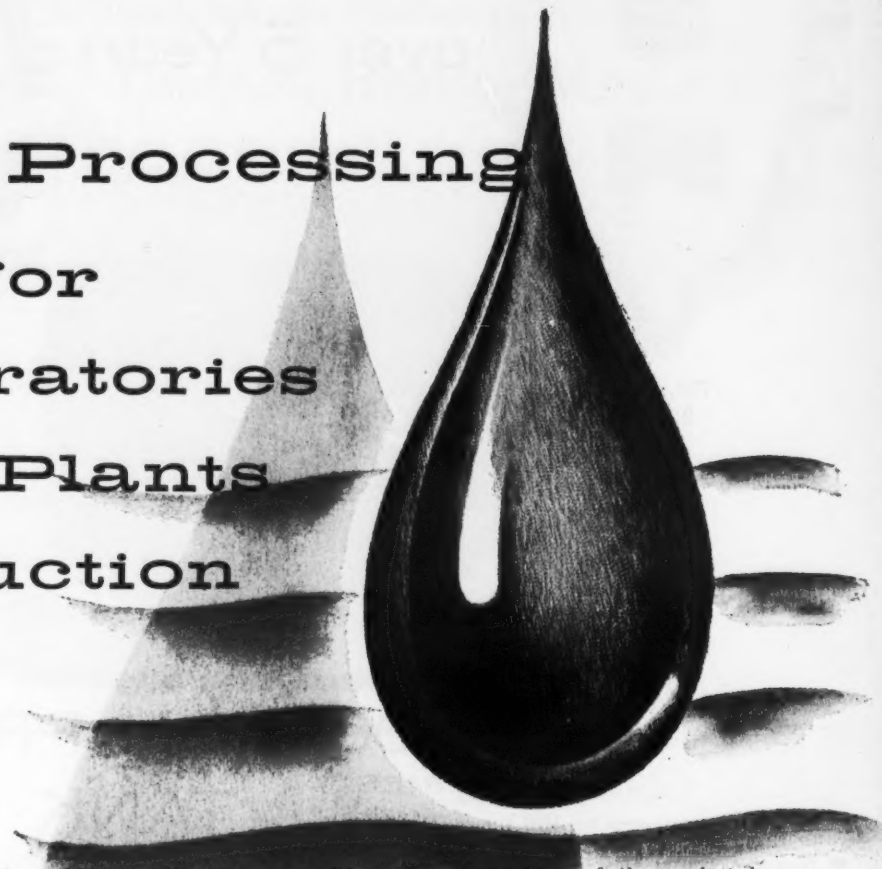
Time ranges offered include 60 min, 5 hr, 12 hr, or 24 hr. Minimum setting of each timer is equal to 4% of its range. A 12″ circular chart is used to record all data.

(Elapsed-time controller 7003 is product of Weston Instruments Division, Daystrom, Incorporated, 614 Frelinghuysen Ave., Newark 12, N.J.)

Check 2103 opposite last page.

Water Processing for

- Laboratories
- Pilot Plants
- Production



• There are few basic problems which offer the confusion of choices presented by the broad needs of water treatment.

Whether in laboratory, pilot plant or production uses, purity and quantity requirements vary widely . . . while the nature of the raw water supply introduces still further variables in the selection of methods and equipment for efficient, economical water treatment.

Because proper water processing is so critical to many of the life sciences served by American Sterilizer, Amsco Research has long conducted a continuing two-part study of the project. The first part of the project has been concerned with establishing valid standards of quality for a broad range of water uses. The second, develops advanced methods and equipment which will produce ample quantities of water of required purity . . . at the lowest initial and operating costs to the user.

Experience indicates that an informed review of your water processing practices can be expected to reveal substantial opportunities for improvements and savings. We'll be happy to provide details . . . with no obligation.

AMERICAN STERILIZER
ERIE • PENNSYLVANIA

AMSCO Water Processing Systems include Stills from ½ to 500 gallons per hour; Deionizers to 1,000 gallons per hour.

• Write for Scientific and Industrial Division Bulletin IC601-R.

WORLD'S LARGEST DESIGNER AND MANUFACTURER OF STERILIZERS, SURGICAL TABLES, LIGHTS AND BIOLOGICAL EQUIPMENT FOR INDUSTRY AND RESEARCH

Check 2104 opposite last page.

ADVANCED DESIGN!

Field-tested over 5 Years

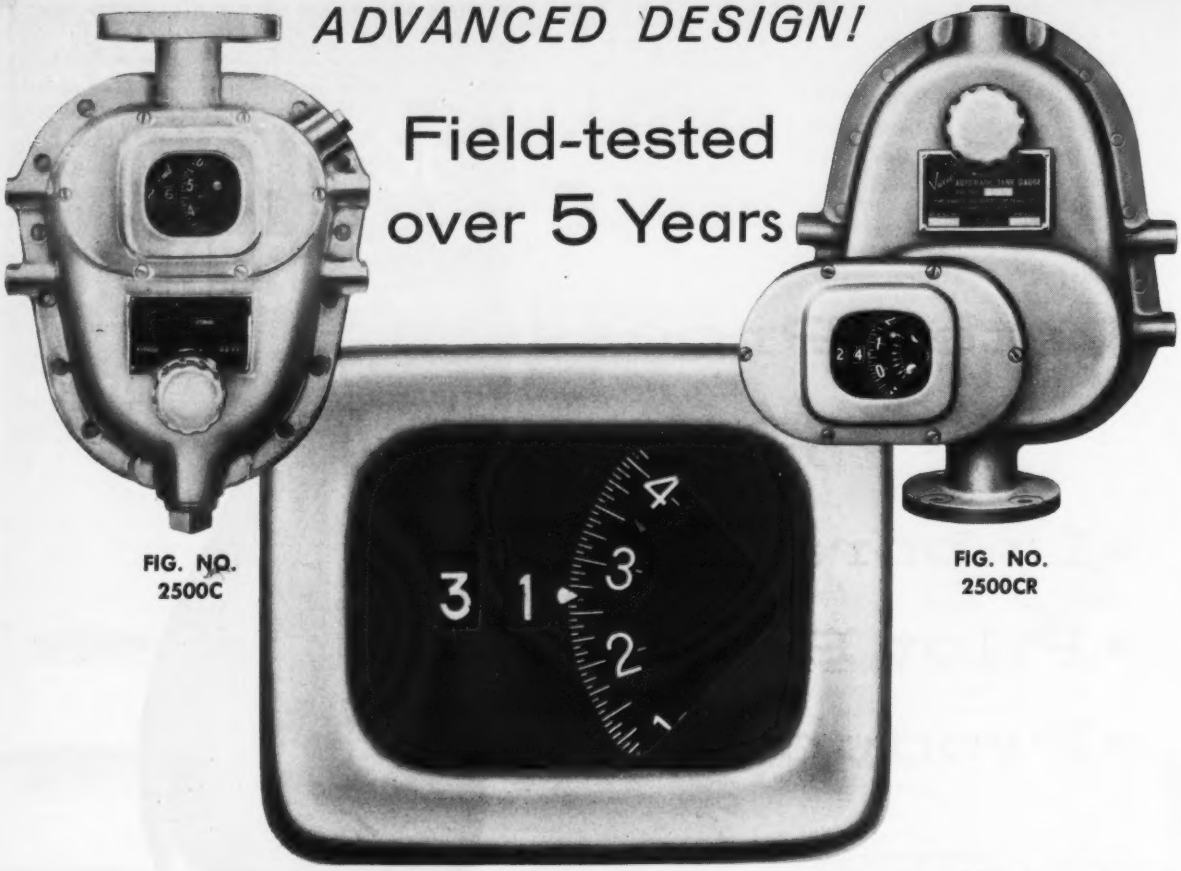


FIG. NO. 2500C

FIG. NO. 2500CR

Fig. 2500 HIGH PRESSURE SERIES TANK GAUGES with the *VISADIAL*®

- **Working pressures to 300 p.s.i.**
- **Neg'ator motor powered.**
- **Magnetic drive.**
- **Accessory mounting on gauge head.**
- **Largest dial and counter numbers of equal size.**
- **Fraction dial in 1/16th inches — largest and easiest to read.**
- **Counter housing vented to atmosphere to prevent fogging.**
- **Mounting for side or front reading.**

"Imitation is sincere flattery" . . . so "Varec" is gratified by the wide acceptance of contemporary designers. The Neg'ator Motor . . . now hailed as a remarkable innovation in gauge head engineering . . . was introduced in gauging by "Varec" ten years ago. The Magnetic Drive . . . a device to positively seal off high pressure tank vapors from the look box . . . was first developed by "Varec" five years ago. Continued research and refinement of design has brought the "Varec" Figure 2500 Series High Pressure Gauges to their present advanced design. NOW . . . a new first . . . these gauges are available with the ***VISADIAL***, the dial and counter so large and legible that readings may be made with great accuracy and ease. This feature is a "Varec" exclusive!

Get full information on these performance-proven High Pressure Tank Gauges . . . it costs no more to have the best. Send for Bulletin CP 3008.

"Varec" TRADE ® MARK

THE VAPOR RECOVERY SYSTEMS COMPANY

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"VAREC", 2820 NORTH ALAMEDA STREET, COMPTON, CALIFORNIA. *Branches and Representatives in Principal Cities.*

Check 2105 opposite last page.

Date and time printed on strip charts automatically

Uses: Printing time and code number or letter on strip charts.

Features: Unit automatically prints date, time (to nearest minute) and remotely selected code number or letter on strip charts.

Description: Time clock or printer operates continuously on 60-cy line. Printing mechanism is provided for operation on any AC or DC voltage from 24-115. Up to 12 code numbers are available, selected by remote selector switch, stepping relay or other combination of contacts. Kit is available for all popular makes of strip-chart recorders. It includes rubber for chart platen, mounting screws, plexiglas window to replace original one in recorder door, plastic transparent cover for device itself and instructions for installation.

(Identichart RI-5 automatic printer is product of Royson Engineering Co., Hatboro, Pennsylvania.)

Check 2106 opposite last page.

Ultrasonic flowmeter *uses echoing beam*

Uses: Measuring liquid flow in pipe from outside pipe.

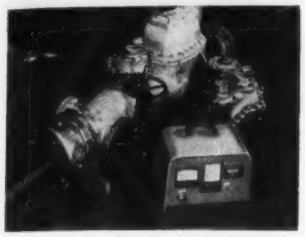
Features: Flowmeter employs high-intensity sound waves transmitted through walls of pipe to flowing liquid, in order to measure quantity and rate of flow.

Description: Ultrasonic flowmeter utilizes beam projected from transducers to measure flow. Beam echoes back and forth inside pipe. As rate of liquid flow causes shift in beam which is continually measured by receiving elements. These transform the degree of shift into voltage. Voltage is amplified and read on dials in terms of rate of flow and total flow.

Instruments consist of two basic units. First is a short piece of pipe same length as standard valve. This has two sets of small transducers on

outside, but nothing on inside. It would normally be permanently installed near meter or some other suitable location system.

Second unit is portable and conveniently handled by one man. It is transreceiver incorporating rate of flow, chart recording and totalizing information. Pair of wires connect

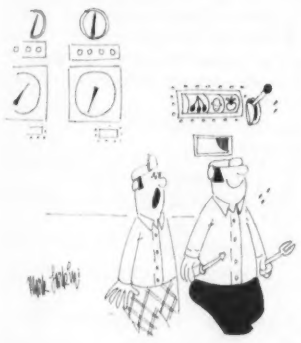


Ultrasonic flowmeter measures flow of liquids through pipe from outside pipe

it to transducers on pipe. Simple dial shifting is feasible to permit unit to test flows in number of different sizes of pipe up to full-flow range. Device can be powered from standard 12 v storage battery.

(Ultrasonic Flowmeter UF-100 is joint development of Hersey-Sparling Meter Company, Dedham, Mass., and Gulton Industries, Inc. It is described in Bul S9—Gulton Industries Inc., 212 Durham Ave., Metuchen, N. J.)

Check 2107 opposite last page.



"You'll never get away with it!"

MARK LARKIN, ELECTRA MFG. CO.

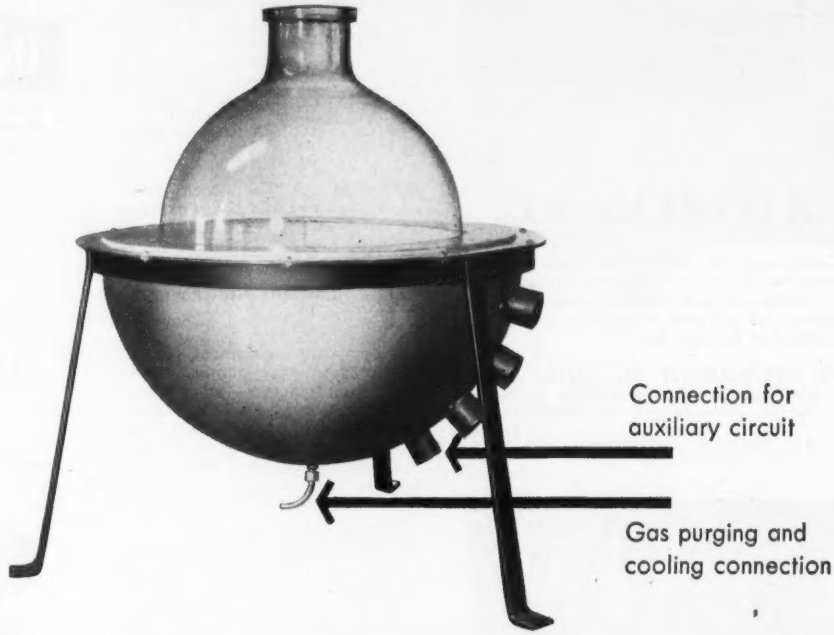
Safety and Control to the Last Drop!

Here's the ultimate in safety and control for distillation and fractionation processes

..the series "U" Glas-Col Heating Mantle

. . . with small auxiliary circuit to supply vaporization heat for high-boiling residues*

. . . with special connections for gas purging and cooling**



AUXILIARY CIRCUIT: Each Glas-Col Series U Heating Mantle includes a small auxiliary circuit at the bottom, center.

When a small amount of high-boiling residue remains in the flask, this circuit can be used to furnish the heat of vaporization . . . while the upper circuits are turned off or operated at reduced heat input. This prevents superheating of the bare wall of the flask above the liquid level, and thus eliminates damage to flask, damage to heat-sensitive chemicals, and superheating of vapors before they reach the column.

At the beginning of a fractionation, when the flask is full of liquid, the upper circuits can be adjusted so input is just INSUFFICIENT to maintain the desired rate of flux. THEN the small auxiliary circuit can be cut in and out to obtain the desired reflux rate.

GAS PURGING AND COOLING CONNECTION: Fire hazards are eliminated because heating elements can be continuously blanketed by a slow stream of inert gas such as nitrogen, which is bled in through a special connection.

And cooling can also be accomplished by passing air into the special connection and through the mantle housing.

Sizes and Prices: *Glas-Col Series U Mantles are available for flask sizes ranging from 1 liter through 22 liters. Made with quartz fabrics, Series U Mantles are designed to operate at temperatures to 650°C. Prices range from* **$34.00 to $144.00.**

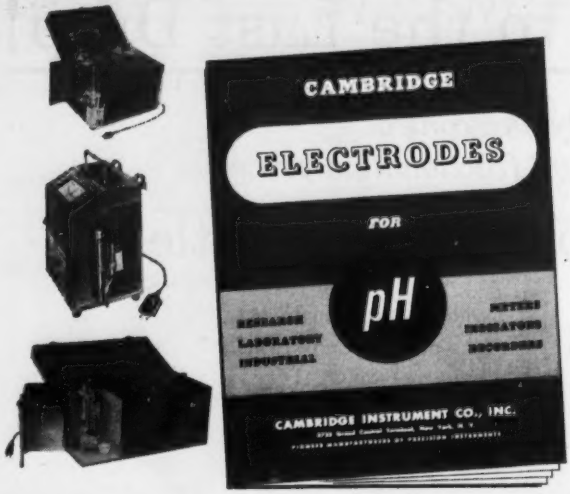
GLAS-COL Electric Heating Mantles

*U. S. Patent No. 2,739,220 **U. S. Patent No. 2,739,221

Glas-Col Apparatus Co., Inc.
Dept. CP
711 Hulman Street
Terre Haute, Indiana

New Bulletin! *For more detailed information, ask for Bulletin 4-D*

Check 2108 opposite last page.



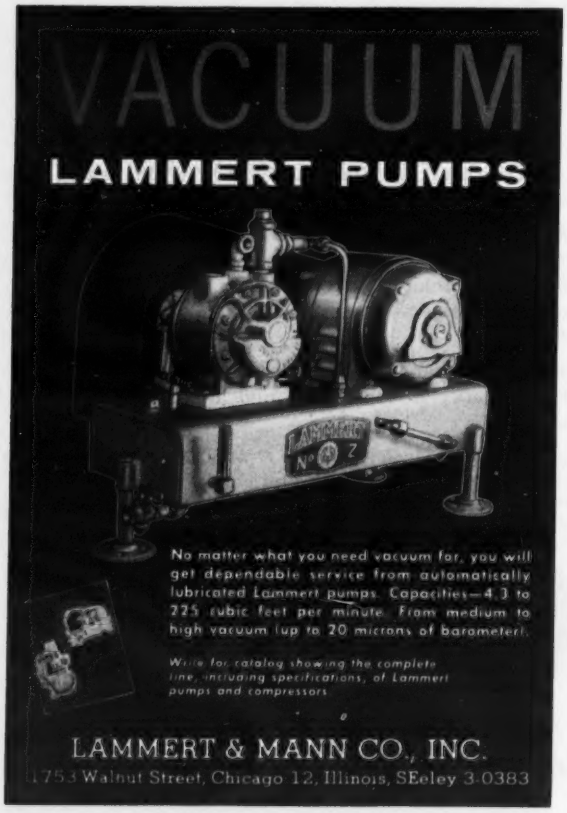
SEND FOR

FREE BULLETIN No. 912

Three models of Cambridge pH Meters, as well as the single and multi-point Recorders are available for a wide variety of Chemical, Industrial and Medical applications. The electrodes designed for use with these high accuracy instruments are described in Bulletin No. 912.

CAMBRIDGE INSTRUMENT CO., INC.
1618 Graybar Bldg., 420 Lexington Ave. New York 17, N.Y.
PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

Check 2109 opposite last page.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No matter what you need vacuum for, you will get dependable service from automatically lubricated Lammert pumps. Capacities—4.3 to 225 cubic feet per minute. From medium to high vacuum (up to 20 microns of barometer).
Write for catalog showing the complete line, including specifications, of Lammert pumps and compressors.
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Check 2110 opposite last page.

NEW LITERATURE
Process Instrumentation and Laboratory Apparatus

Differential-pressure/current transmitter measures differential pressures from 0-20 to 0-400″ water range, and transmits proportional 4- to 20 milliamp DC signal. Transmitter is covered in Specification FS301-7 — Industrial Division, Minneapolis-Honeywell Regulator Company.

Check 2111 opposite last page.

Temperature- and humidity-control devices are subject of 41-page catalog which incorporates temperature-conversion chart from °C to °F and vice versa. Cat 560 — American Instrument Co., Inc.

Check 2112 opposite last page.

Servo-type plotter, which draws curves in Cartesian coordinates on 24 x 36″ chart paper, is expanded upon in single-sheet Bul 794-1 — Houston Instrument Corporation.

Check 2113 opposite last page.

High-pressure equipment, including compressors, pumps, valves, vessels, and gages — all manufactured by Hart & Zn of Holland— are presented in 12-page Hart High Pressure Cat—High Pressure Equipment Company, Inc.

Check 2114 opposite last page.

X-ray techniques are illustrated on 11½ x 22″ wall chart diagramming ten basic methods, with explanatory notes and brief discussion of application details. X-ray Methods Chart — Philips Electronic Instruments, Division of Philips Electronics and Pharmaceutical Industries Corp.

Check 2115 opposite last page.

Laboratory apparatus and instruments of various types are itemized in 16-page supplement to basic company catalog. LabLog 3-59 — Will Corporation.

Check 2116 opposite last page.

Optical-emission spectrographic-instrument line is detailed in Spectrochemical Instruments Bul — Spectrochemical Division, Baird-Atomic, Inc.

Check 2117 opposite last page.

Analog computers' use and programming are taken up in a technical article which is second in series on general subject of analog computers. Two problems are investigated to show a technique — suspended pendulum and inverted pendulum. Tech Note 2 — Donner Scientific Company.

Check 2118 opposite last page.

For Accurate TEMPERATURE RECORDS at MODERATE COST

RANGES AVAILABLE
Temperature Range
One Rotation of Chart
−30° to +120°F. 7 Days
−30° to +120°F. 24 Hours
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−10° to + 50°F. 24 Hours
−10° to + 50°F. 24 Hours
10° to 90°F. 24 Hours
30° to 60°F. 7 Days
40° to 100°F. 24 Hours
40° to 100°F. 24 Hours
50° to 130°F. 24 Hours
60° to 90°F. 8 Hours
60° to 90°F. 24 Hours
70° to 130°F. 24 Hours
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BULB-TYPE (illustrated)—*For recording temperatures at a distance*
BI-METAL TYPE — *For recording temperatures in surrounding air*

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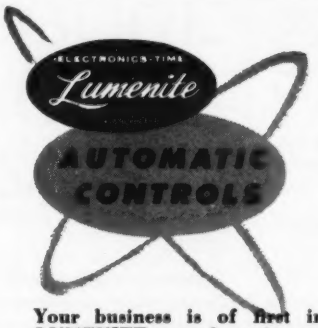
Check 2119 opposite last page.



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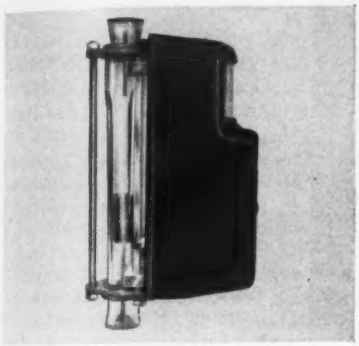
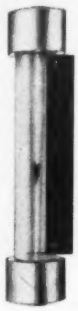
METERING CORROSIVE FLUIDS? Brooks can give you an all-glass *transmitting* rotameter like this . . .

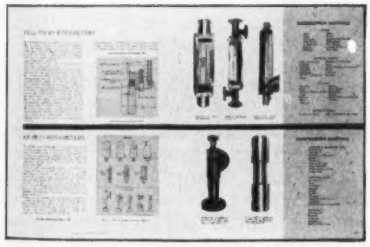


or one with a halofluorocarbon metering tube like this . . .



In fact, we can make a meter to just about any material specifications you might want.

This eight-page bulletin . . .



describes more than a dozen of the many materials available and gives meter construction details. Ask for Bulletin 150, and it's yours.

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Check 2121 opposite last page.

Membrane filter is topic of ten-page manual which describes methods of isolating, sizing, canting and identifying particles in air, gas and liquid streams. Fine Particles Manual 3 — Gelman Instrument Company.

Check 2122 opposite last page.

Electrical testing instruments of laboratory standard quality are presented in illustrated 24-page World Standards Bul — Weston Instruments Division, Daystrom, Inc.

Check 2123 opposite last page.

Diaphragm slurry pump for metering slurries with as much as 60% solids is detailed in four-page bulletin incorporating detailed drawings explaining operation. Bul 1158—Milton Roy Company.

Check 2124 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Laboratory-ceramics line is outlined in four-page bulletin which reports sizes and composition of zirconium-silicate boats, crucibles, covers, pedestals, inserts and sleeves. Laboratory Ceramics Bul — Saxonburg Ceramics, Inc.

Check 2125 opposite last page.

Voltage digitizers are pictured and specified in six-page Voltage Digitizer Brochure — Adage Inc.

Check 2126 opposite last page.

Glass laboratory ware is reviewed in 8-page brochure which is supplement to basic catalog of manufacturer. Approximately 78 additions to line are outlined in Supplements 4-10, Cat LG-1 — Corning Glass Works.

Check 2127 opposite last page.

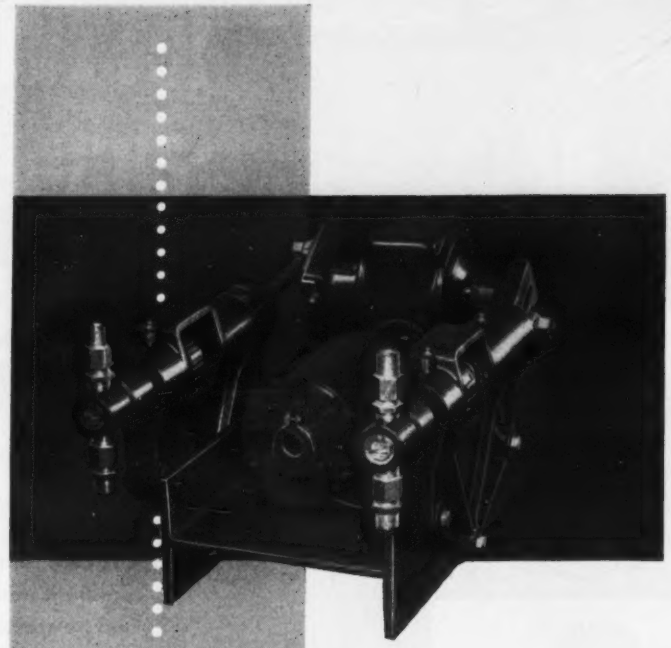
Computer codewriters are expanded upon in four-page bulletin which covers input, output and combination input-output models. Bul IP-01 — Industrial Products Division, Royal McBee Corporation.

Check 2128 opposite last page.

Metering pumps are tabulated in catalog which incorporates data on design and construction. Cat 200 — Pump Division, American Meter Company.

Check 2129 opposite last page.

POSITIVE CONTROL OF *MATERIALS IN MOTION* BIF METERS FEEDERS CONTROLS



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Capacity from 0.8 gph to 850 gph.
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For complete details on Model 1140 request Bulletin 1140.20-1. Write **B-I-F Industries, Inc., 387 Harris Ave., Providence 1, R. I.**

Check 2130 opposite last page.

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FOR RUGGED DUTY... NEW design axial fans *In sizes up to 60 inches!*

Move corrosive or explosive fumes, extreme heat or high humidity with new PROPELLAIR Type BT belt driven axial fans. They feature heavy 10 and 12-gage drums . . . isolated, air-cooled, protected bearings and belts . . . airfoil propellers cast of hi-strength aluminum-magnesium alloy . . . Robbins & Myers *"All-Weather"* motors for a single nameplate guarantee on the complete unit.

Hi-pressure, big hub propellers are available for those tough applications developing high resistance.

Send today for complete information on this modern, efficient fan. Ask for Bulletin 620—CP

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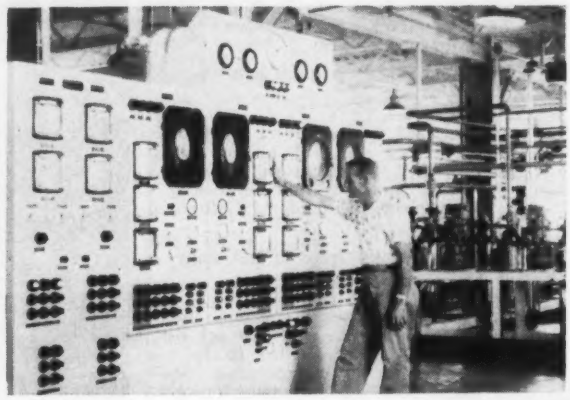
MOVING AIR IS OUR BUSINESS®

Check 2131 opposite last page.

CP IDEAS: from other industries and nuclear field — new trends in research, process, services

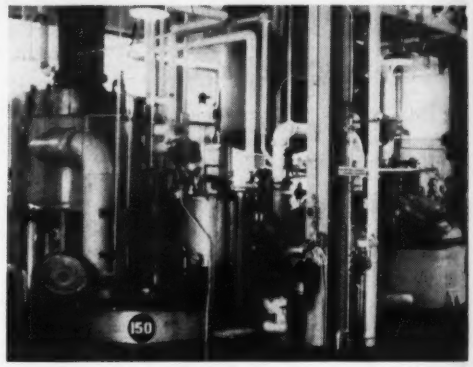


Polymerizations are accurately controlled from this centrally-located instrument panel

Reactors are equipped with automatic defoaming systems

CP Staff Photos

Proving that properly planned and designed plants can be started up with minimum difficulty, multi-million dollar facility wasted no time getting into full production. Designed for maximum flexibility as well as 20 million lb per yr output, plant . . .



Produces 'Tailor-Made' Polymers

TED F. MEINHOLD, Associate Editor
with **HARRY R. MARTY,** Plant Manager, and
ROBERT MACNALLY, Latex Area Supervisor
Dewey and Almy Chemical Division,
W. R. Grace & Co.
Owensboro, Kentucky

Time seems to indicate that Dewey and Almy's decision to build its Owensboro polyvinyl acetate emulsion and butadiene-styrene latices plant was a wise one. Preparing to celebrate its first anniversary next month (it was dedicated June 29, 1959), the multi-million dollar installation is having no difficulty finding outlets for its products and is already talking about expansion.

Total capacity is over 20 million pounds per year—which is nearly twice D&A's previous PVAc and butadiene-styrene latex output.

Efficient planning, sound engineering, and a good operator training program kept startup headaches down to a minimum. Production climbed quickly. Within the first few weeks fate called upon the plant to pass the "acid test". An explosion at one of the firm's eastern plants seriously knocked out production. An urgent call for help went out to the new plant.

Production shifted into high gear. Relatively inexperienced operators were turned into veterans practically overnight. Result: Owensboro's output more than filled the gap. Shipments went out on time and the day was saved.

Plenty of Space

Centrally located in the heart of midwest and southern marketing areas, the facility occupies a 143-acre site along the Ohio river about five miles upstream from Owensboro, Kentucky. The plant's four major buildings cover only about two acres—allowing plenty of room for expansion. There are actually two plants on the site, since one of the buildings is used to manufacture battery separators.

(This article deals only with the chemical plant).

The installation was engineered to be a balance between mass production and the firm's traditional "customer-tailored" service. Designers wanted a facility that combined rapid, automatic manufacture of a uniform product with flexibility—so that products could be adjusted to meet individual customer requirements.

Twenty-six basic formulations of PVAc polymers are currently being produced. Butadiene-styrene latices are available in 12 basic formulations.

Twin Production Lines

The plant is laid out in two straight, parallel lines—one for making PVAc emulsions, the other for latex products. Raw materials (vinyl acetate monomer, butadiene and styrene) are stored in eight tanks down by the river. Tanks range in size from 15,000 to 60,000 gal including two 45,000-gal spheres for butadiene.

Leaving the tank farm, raw materials are piped to the polymerization building. Entirely explosion-proof, the structure is divided into two sections, a preparation area and a reaction area. Automatic meters, accurate to within plus or minus ¼ of 1%, control flow of incoming materials. Amounts are automatically corrected for volume changes caused by temperature variations.

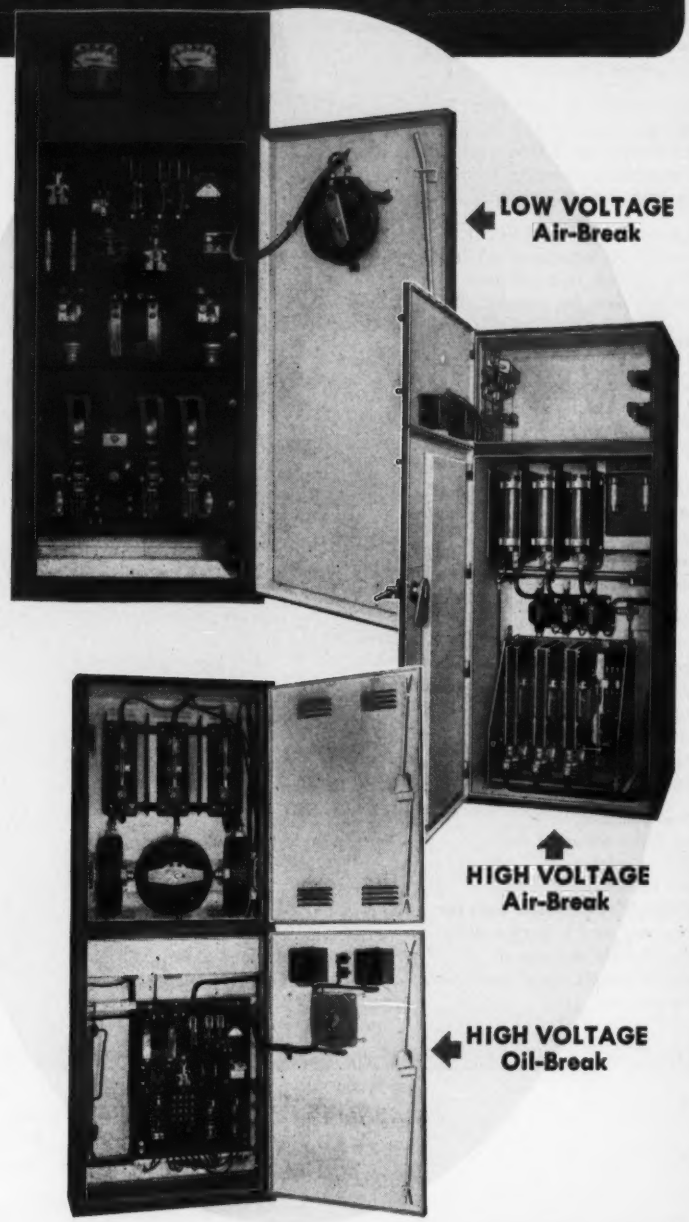
Ingredients for a batch are made up in stainless steel floor tanks. Preparation area contains 15 of these units ranging in capacity from 200 to 1000 gal. Monomers, emulsifiers, catalysts and other materials are measured and made ready for charging to the reactors.

PVAc polymerizations are normally conducted at atmospheric pressure. Latices are reacted at 50 to 60 psi since the butadiene monomer must be kept in liquid form. Critical factors during reactions are temperature, pressure and pH. Temperatures for PVAc batch-

To page 149

IT'S EC&M FOR A COMPLETE LINE OF SYNCHRONOUS MOTOR STARTERS!

FOR ALL LOW VOLTAGES AND FOR 2200-4800 VOLT POWER SYSTEMS!



Here's Why EC&M Pushbutton Automatic Starters Do The Job Better...

Complete protection during starting, acceleration and while running at synchronous speed.

Motor pulls into step without delay because field is applied under best conditions for synchronization.

Automatic field removal and re-synchronization allow motor to accelerate and re-synchronize after voltage dip or momentary overload.

Easily installed because all internal wiring is complete.

Full or reduced voltage starting All high voltage starters available in 3 ratings: (*1*) 50,000 KVA (certified) interrupting capacity—(*2*) with power-type, current-limiting fuses—(*3*) VALIMITOR® (volt-ampere-limitor), the bus may be of unlimited KVA.

Write for Bulletins 8200 and 8820

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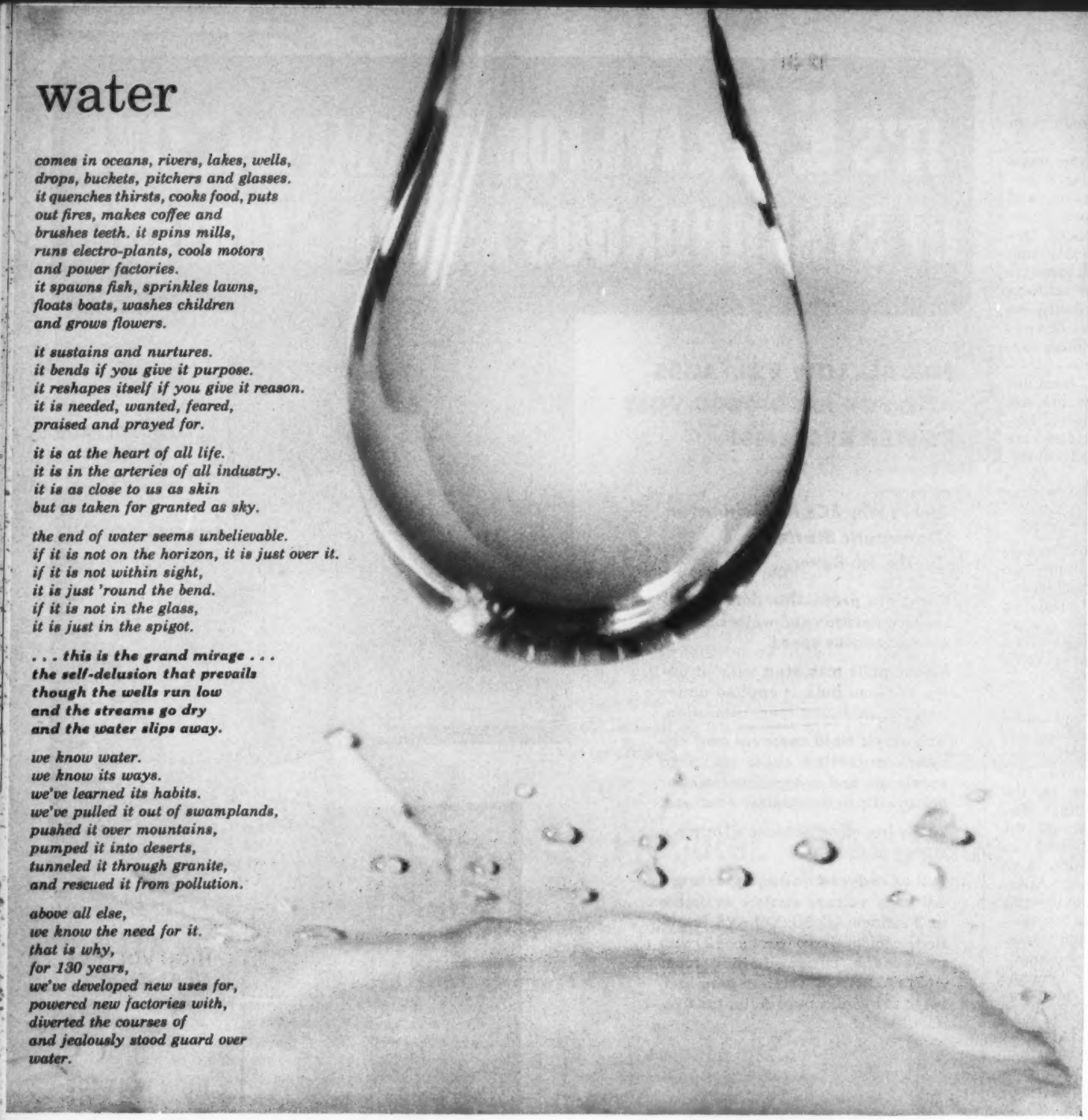
Check 2132 opposite last page.

water



comes in oceans, rivers, lakes, wells,
drops, buckets, pitchers and glasses.
it quenches thirsts, cooks food, puts
out fires, makes coffee and
brushes teeth. it spins mills,
runs electro-plants, cools motors
and power factories.
it spawns fish, sprinkles lawns,
floats boats, washes children
and grows flowers.

it sustains and nurtures.
it bends if you give it purpose.
it reshapes itself if you give it reason.
it is needed, wanted, feared,
praised and prayed for.

it is at the heart of all life.
it is in the arteries of all industry.
it is as close to us as skin
but as taken for granted as sky.

the end of water seems unbelievable.
if it is not on the horizon, it is just over it.
if it is not within sight,
it is just 'round the bend.
if it is not in the glass,
it is just in the spigot.

. . . this is the grand mirage . . .
the self-delusion that prevails
though the wells run low
and the streams go dry
and the water slips away.

we know water.
we know its ways.
we've learned its habits.
we've pulled it out of swamplands,
pushed it over mountains,
pumped it into deserts,
tunneled it through granite,
and rescued it from pollution.

above all else,
we know the need for it.
that is why,
for 130 years,
we've developed new uses for,
powered new factories with,
diverted the courses of
and jealously stood guard over
water.

Fairbanks, Morse

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No other manufacturer makes pumps for such a variety of hydraulic applications as Fairbanks, Morse. If it's liquid . . . if it flows . . . we make the pumps that move it . . . at low cost per gallon . . . in sizes from 200 gph to 800,000 gpm, and to 3000 psi . . . for every industrial need.

Our pumps . . . our generators and controls . . . our new rotary compressors . . . our drive toward better ways to de-salt ocean water . . . the potential of our advance Research & Development Center in Beloit . . . our lead position in the field of Hydrodynamics . . . all of these equip us to serve you.

Send for our brochure—"Hydrodynamics." Please write to Mr. Robert W. Kerr, President, Fairbanks, Morse & Company, 600 South Michigan Ave., Chicago 5, Illinois.

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Additional details will be sent direct to you.

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to fill in the slip with the other pertinent information: your name, title, company, product made, and address.

For more information on product at left, specify 2133 see information request blank opposite last page.

"Tailor-made" Polymers

From page 147

es vary between 130 and 170°F, with pH ranging from four to seven. Latices are produced under approximately same temperature conditions, but pH is maintained between 10 and 11. Retention times range from eight hours to two days.

Guard Against Contamination

Extreme care is taken to avoid metal contamination. Even trace amounts of iron, copper, manganese, or other heavy metals must be kept out of a batch since they will affect reactions, cause unwanted coagulation and discolor products. To minimize risk, all ingredients are filtered prior to batch preparation. Demineralized water is used exclusively in formulations. Stainless pipe and equipment is the rule once a batch leaves the preparation area.

Once a reaction has started, automatic and partially automated, instrumentation takes over. All controls are located on centrally located instrument panel.

An elaborate company-designed foam reducing system is installed on top of each of the latex reactors. Involving automatic process pressure control, antifoam agent injection and "electric-eye" alarms, the system bypasses need for constant operator attention and minimizes product loss.

Strict Quality Control

After passing series of rigid quality control tests, products are ready to be transferred from the reactors to storage tanks. PVAc emulsions are cooled to about 100°F and moved by humidified air to phenolic-lined tanks. Ten vessels, ranging in capacity from 6000 to 12,000 gal, are used for PVAc storage. Tanks are served by rigid polyethylene pipe.

Latices are filtered before being pumped to storage tanks. This removes any coagulation which may have formed during reaction. Since danger of metal contamination ceases

Traylor-Made . . . means rugged dependability in heavy machinery. 60 years of industrial engineering experience goes into our ROTARY KILNS, PRIMARY and SECONDARY GYRATORY CRUSHERS, JAW CRUSHERS, APRON FEEDERS, BALL MILLS.

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Check 2134 opposite last page.

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PRECISION MIXING

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from a few pounds to over 16 tons, with

Daffin MACLELLAN BATCH MIXERS

Used by industries the world over to mix and/or blend a complete batch of dry, free-flowing ingredients in one-minute cycles. Exclusive design prevents material separation or particle breakdown regardless of densities. Fast loading, unloading. Easy to clean.

CAPACITIES: 5 qts. to 160 cu. ft. Hand and motor driven models. All sizes available in stainless steel, other alloys.

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Binks spray nozzles

for washing, cooling, processing, humidifying, dehydrating, and hundreds of other applications.

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There is a size and spray pattern for every purpose... with nozzles cast or machined from standard or special corrosion-resistant metals and materials.

MAIL COUPON NOW!

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A COMPLETE LINE OF INDUSTRIAL SPRAY NOZZLES AND COOLING TOWERS

Binks Manufacturing Company
3120-32 Carroll Ave., Chicago 12, Ill.
O. K. Binks, send me your comprehensive Spray Nozzle Catalog without obligation.

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ADDRESS_____
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Check 2136 opposite last page.

once reaction is completed, latices may be transferred by ordinary methods through conventional equipment. Phenolic-lined, 15,000 gal tanks are used for storage.

Storage area is designed to permit fast and efficient blending of batches to meet exact customer requirements. All products are again filtered and tested before delivery. If customer phones an order, material is immediately filtered and put into hold tanks, so that it can be moved into tank trucks, tank cars or drum without delay for filtering.

Efficient bulk loading dock can handle three tank trucks and a tank car at same time. An operator bearing the loading hose simply enters a small cage from catwalk, cranks himself down directly over vehicle to be loaded, and begins to fill.

(Further information about Darex and Everflex polyvinyl acetate emulsions and Darex butadiene-styrene latices may be obtained from Dewey and Almy Chemical Division, W. R. Grace & Co., Cambridge 40, Massachusetts.)

Check 2137 opposite last page.

Determine leakage rates for nuclear reactor building materials

Results may help cut costs of A-power stations

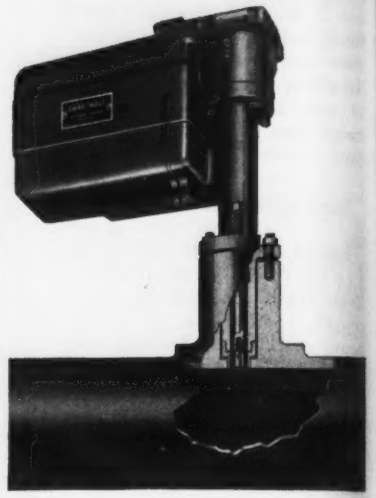
Program to determine the most economical materials suitable for use in nuclear power reactor housing structures is in full swing at Atomics International, Division of North American Aviation, Inc. A sphere-shaped, 10-ft vessel is being used for the AEC-sponsored program at the company's Canoga Park, California, plant.

Components up to six sq ft can be tested in the vessel, which is equipped with instrumentation and inspection access ports. Pressure differentials up to five psi can be applied during tests.

Standard building components, including doors, metal, and concrete wall panels, and

Great things are happening in AutroniC® Control

TOUGH PROBLEMS ARE NO PROBLEM



FOR THIS FOOLPROOF, FOUL-PROOF PRESSURE TRANSMITTER

Here is a primary sensing element for those tough jobs you'd like to forget. Mounted right on the process pipeline or tank, the Swartwout Flush Diaphragm Pressure Transmitter will effortlessly measure pressure or liquid level of polymers, slurries, asphalts, viscous fluids, molten metals and other difficult media. No stagnant pressure lines, no steam jacketing necessary . . . the stainless steel transmitter diaphragm fits flush with the inside of the vessel.

A friction-free linkage multiplies diaphragm motion and actuates the core of a differential transformer to produce a 0-0.5V AC signal for any Swartwout AutroniC indicator, recorder or controller. Sensitivity is better than 0.005%, reproducibility 0.1%, accuracy 1.0%.

The Flush Diaphragm Pressure Transmitter is just one unit in the constantly-growing AutroniC family of electronic instrumentation . . . a family that includes all necessary components for complete electronic control of any process parameter.

For details on the Flush Diaphragm Pressure Transmitter, request Bulletins A-713 and A-718. Swartwout Division, Crane Co., Hooksett Industrial Park, Manchester, N.H.

SWARTWOUT

. . . world leader in electronic process instrumentation

9.A. 1980

Check 2138 opposite last page.

roofing materials are placed in the unit. Device has movable hemispheres. After test material is placed in one of the hemispheres, they are brought together and sealed by a gas-tight diaphragm.

Air flow may be from either side of the sphere to the other, since each half is identically equipped and instrumented. It is also possible to check two components simultaneously by

Sphere-shaped, 10-ft diameter experimental vessel tests leakage of materials used for constructing nuclear power reactor buildings

separating the sphere, mounting two diaphragms on the hemispheres, and maintaining differential pressures relative to atmospheric pressure.

The program should help lower capital costs of nuclear power reactor installations by determining which materials used in reactor buildings have lowest leakage rates. It is also expected that information gained will lead to standards for calculating leakage rates of building materials.

(Information courtesy of Atomics International, Division of North American Aviation, Inc., P.O. Box 309, Canoga Park, California.)

NEXT MONTH

Magnesium silicate is generally thought of as a mined or naturally occuring compound. In our next issue we will act as your guide touring a unique plant that makes the synthetic product. Be sure to look for it in the Idea Section.

SILICONE NEWS from Dow Corning

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IN VARNISH COOKING

Job-proved as fastest and most effective for all processing operations, Dow Corning silicone defoamers are available in different forms for different systems. Why not make tests on the materials that are giving you foam problems?

A generous trial sample is yours for the asking. Write for this FREE SAMPLE, giving an indication of your problem and the type of system — oil, aqueous, non-aqueous, food product or other. Address Dept. 3205 for prompt reply.

Silicone Defoamer Beats Down Foam ...Defeats High Maintenance Cost

The chief engineer of a southern chemical plant periodically met real bugbears—foam boil-overs in a methanol-wood oil fractional distillation system. Such occurences meant shutting down the still, while over 600 man hours were spent putting the unit back in condition.

That was before testing silicone defoamers. Now, foam's completely eliminated simply by adding only 5 parts per million of Dow Corning Antifoam A. Boil-over clean-up man hours are nil. The chief engineer champions this silicone defoamer as the most effective system — says, "Without it, I'd simply go crazy."

If foam is fouling up your processing, putting you behind schedule and leaving you with too high a ratio of waste material, chances are you can lick foam once and for all — realize noteworthy savings through the use of Dow Corning silicone defoamers. Easy to use and economical, these silicone defoamers are widely used to overcome foam problems in processing varnish, paints, adhesives, asphalt, textile dyes, petrochemicals, foods and many other products.

FAST DISPERSING, FAST ACTING

Your nearest Dow Corning office is the number one source for information and technical service on silicones.

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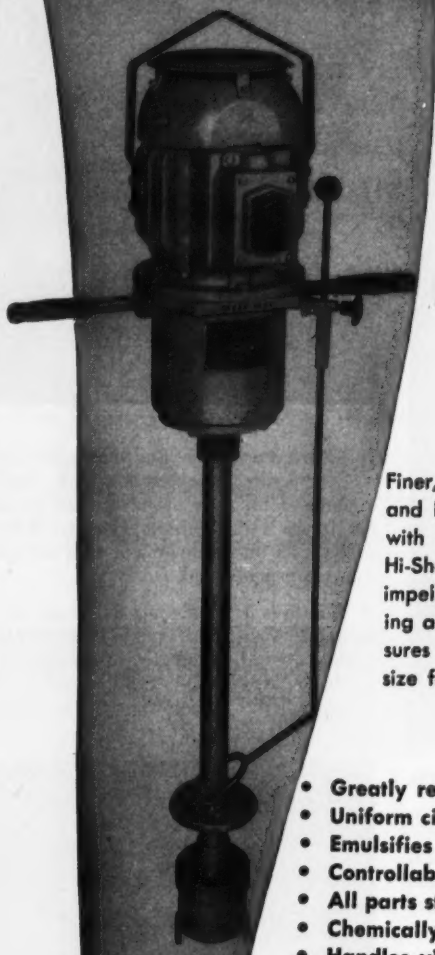
ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Check 2139 opposite last page.

SHEAR-FLOW



the modern mixer with power shearing

Finer, faster blending, dispersing and homogenizing is now possible with Shear-Flow's new Model RL Hi-Shear Head. Finely spaced dual impellers induce considerable shearing action and high pumping pressures that rapidly reduce particle size for superior material mixtures.

- Greatly reduces mixing time
- Uniform circulation—no vortex
- Emulsifies immiscible liquids
- Controllable flow pattern
- All parts stainless steel
- Chemically inert seals
- Handles viscous materials with ease
- No operating Torque
- Disperses, blends, homogenizes

GABB SPECIAL PRODUCTS INC.
Windsor Locks, Conn.

☐ Have representative call
☐ Send more information

Name_____

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Check 2140 opposite last page.

Solutions containing salt, acetic acid withstood by titanium kettle

Made by deep-drawing method to provide seamless shell

Titanium kettle during fabrication. Successful deep-drawing technique that eliminated seams were developed by fabricator

Problem: Two different corrosion-resistant metals commonly used for kettles in the food industry were seriously corroded by certain types of foods at H. J. Heinz Company plants. Pits or perforations were formed in those kettles used for solutions containing acetic acid and sodium chloride.

Solution: A 250-gal titanium kettle was made and tested under the same corrosive conditions in the Heinz plants at Holland, Mich.; Pittsburgh, Pa.; and Chambersburg, Pa.

Vessel Fabrication

Kettle was fabricated by deep-drawing the titanium to provide a seamless shell. In addition to inner shell which contacts the food being prepared, outer shell was also made of titanium so it could be welded to the inner shell. Titanium for inner shell was R-55 grade and for outer shell, it was R-70 grade.

Inner shell of the 250-gal kettle is a 45″-diameter hemisphere drawn from 0.178″-thick sheet. Outer shell is a similar shape formed from

"Fine . . . but what about the purchasing techniques I sent you to Europe for?"

0.125″ sheet. Blanks for both shells were 66″ square.

Draw rings for the large shells had a 46⅛″ ID, with a draw radius of 1″. Blanks were cut with circling shears and carefully edge-ground to remove all irregularities.

The 0.178″ heated blank was drawn to a depth of 21″ in four stages. Heated 0.125″ blank was formed to a depth of 23″ in six stages. Estimated drawing temperature was 500-600°F.

Corrosive Conditions

Conditions under which the vessel was tested was with food solutions containing up to 4.4% acetic acid and up to 6.0% sodium chloride, with pH being 3.1 to 4.0. Temperatures varied from 60 to 212°F, being at 212° more than 1/3 of the total testing period of 4000 hr.

In addition to the corrosives handled, vessel was subjected to various cleaning agents. These included caustic cleaners, chlorinated trisodium phosphate, scouring powders and hot water. Vessel was cleaned more than 300 times using a variety of procedures according to material being handled.

Results: After a 4000-hr test period under conditions described over a 2½ yr period, titanium vessel emerged corrosion free. It is still bright and free from any signs of attack. Aside from an evaporation rate slower than similar kettles made of another metal, performance of titanium vessel has been excellent.

(Titanium sheet for vessel was furnished by Republic Steel Corporation, 1441 Republic Building, Cleveland 1, Ohio.)

Check 2141 opposite last page.

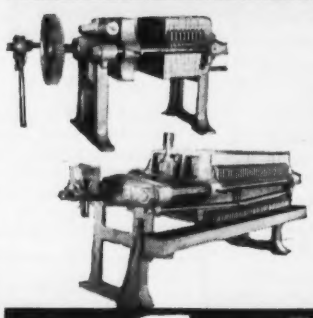
(Titanium sponge for sheet was supplied by E. I. du Pont de Nemours & Company, Inc., Wilmington 98, Del.)

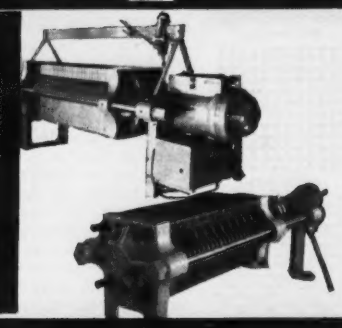
Check 2142 opposite last page.

(Titanium kettle was fabricated by B. H. Hubbert & Son, Inc., 1311 Ponca Street, Baltimore 24, Md.)

Check 2143 opposite last page.

THIS IS sperry total filtration





A COMPLETE RESEARCH AND ENGINEERING SERVICE

. . . Geared to the filtration needs of all industry!

In its Batavia (Ill.) and Yonkers (NY) laboratories, a staff of Sperry specialists are actively engaged in technical service and filtration research. A large backlog of Sperry experience stands by for directional guidance.

From this firm footing comes the engineering that distinguishes the entire Sperry line. SPERRY FILTER PRESSES: All styles and sizes, with center, side or corner feed; open or closed delivery; simple or thorough washing; high or low temperature controls. SPERRY CLOSING DEVICES: In 8 models including the hand operated HANDRAULIC and popular EHC-L Electric models. SPERRY FILTER MEDIA: All types, all sizes, all material. Plain or punched to your specifications.

This is Sperry Total Filtration. Broad in scope, specific in application. Put it to work on the solution of your particular filtration problem. Write today. Or mail coupon for your free Sperry catalog.

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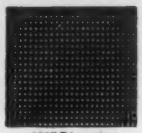
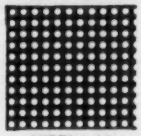
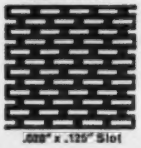
Check 2144 opposite last page.

The Right PATTERN
The Right OPEN AREA
The Right MATERIAL
FOR EVERY SCREENING REQUIREMENT

H&K PERFORATED SCREENS


.020" Diameter


.045" Diameter

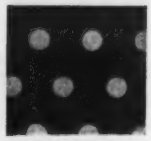

.028" x .125" Slot

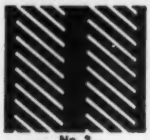
For grading, sieving, dewatering, filtering, straining—when you want a screen "just right" for the job—you can depend on H & K.

H & K screens are made to your order, with holes accurate and uniform in size, shape and spacing. Burr-free holes are slightly larger at bottom—reduce blinding, save on down time. Margins and unperforated areas are furnished as specified.

Screens are made in practically any material desired... including plastic. H & K specializes in perforating stainless steel, monel and other corrosion-resistant alloys. Let us work with you on your screening requirements.

Just a few of the many H&K patterns are illustrated


Tapered Round Holes in Steel


No. 3 Diagonal Slot

FIND NEAREST H&K AGENT IN THE 'Yellow Pages'
Listed Under "Perforated Metals"

Write for H&K General Catalog

THE Harrington & King PERFORATING CO. INC.

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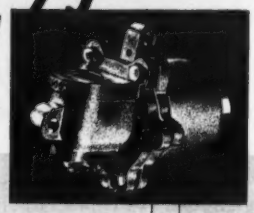
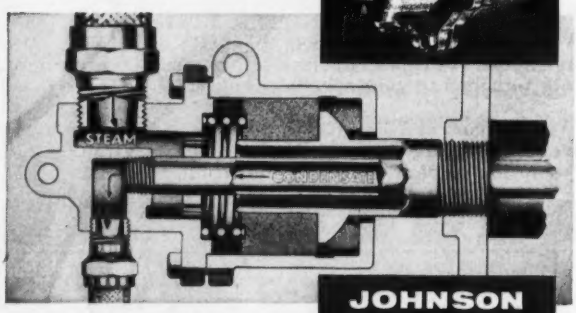
Check 2145 opposite last page.

Need a rotary joint?

... for water-cooled or steam-heated rolls...





Type SB illustrated is completely self-supporting. For fully engineering data write for Bulletin S-3002.

JOHNSON Rotary Pressure JOINTS

Johnson started the whole idea . . . is far ahead in know-how, available types and sizes. Johnson Joints are completely packless, need no lubrication or adjustment. Used on dryer rolls, mills, waxers, calenders, slashers, printing presses, etc.—handling steam, water, hot heat transfer oils, Dowtherm, Mansanto Aroclors, etc. Actually serving under pressures as high as 2400 psi. Sizes up to 8".

THE JOHNSON CORPORATION
826 Wood St., Three Rivers, Michigan

Check 2146 opposite last page.

Conveyor belts get nod from FDA for use in food handling

Firm proves that composition does not harm food

In line with the "food additive" amendment, FDA-approved rubber and Koroseal vinyl conveyor belts have recently been made available for all food handling operations, including fatty, aqueous and dry food categories.

With an eye to the future, the manufacturer, B. F. Goodrich, began preparing to meet FDA's specifications a year ago when it established a special chemical laboratory to undertake a food additive evaluation program. The study is reported to be the only coordinated activity of its kind in the rubber industry.

Qualification of its products under the law followed proof furnished by the company that ingredients used in certain rubber and vinyl compounds do not contaminate food they contact. Goodrich reports that the work has not only furnished proof necessary to qualify some materials traditionally used in the rubber industry, but has established acceptability of new materials which it claims do even a better job than those previously used.

(Further information about FDA-approved conveyor belts may be obtained from B. F. Goodrich Industrial Products Company, Div. of The B. F. Goodrich Co., Akron, Ohio.)

Check 2147 opposite last page.

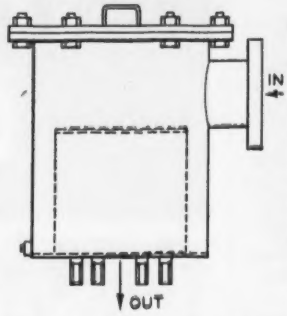
Nuclear waste sites to be located only on Government land

Direct control will help insure public protection

Regional disposal sites for permanent disposal of low-level, packaged, radioactive wastes will be established, as needed, on state or federal Government owned land, according to AEC. Direct control of the land should help insure protection of the pub-

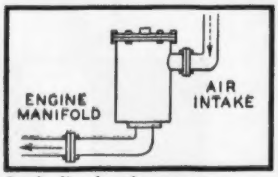
IN-THE-LINE FILTERS

dry-type, oil-wetted and oil bath types

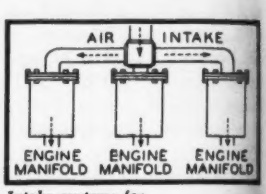


A line of filters for "in-the-line" or "closed circuit" operation is manufactured by The Air-Maze Corporation. Built for efficient filtration of air and gases, these filters are incorporated on remote air intake lines for engines, compressors or industrial heating furnaces. They are used for the filtration of fuel gas to engines; and for filtration of natural gas on transmission or gas processing applications. Cleanable, dry-type units are available for extremely fine filtration, where dust loads are low or where oil must be absent from the gas stream. Oil-wetted and oil bath types available where dirt loads are higher and where continuous low pressure drops are mandatory.

Write for bulletins. The Air-Maze Corporation, Dept. CP-5. Cleveland 28, Ohio. (Subsidiary of ROCKWELL-STANDARD Corporation)



Intake line for air compressor



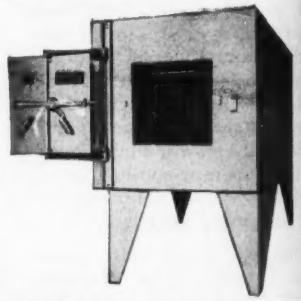
Intake systems for multi-unit compressor station

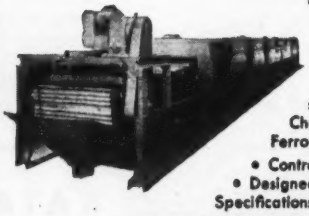
Check 2148 opposite last page.

ELECTRIC FURNACES

Uniform, Controlled Heat to 2700°

ANNEALING FURNACES specially designed for Glass and Steel applications in production and laboratory. Temperature range up to 1400°F.





CONVEYOR FURNACES for Glass Annealing, Baking Resistors, Ceramic Molding, Chemical Drying, Annealing Ferrous and Non-Ferrous Metals.

• Controlled Heat up to 1850°F.!
• Designed and Built to Your Specifications!

WRITE FOR BULLETIN 75-TC.

TRENT INC.

Electrically Heated Industrial Equipment

235 LEVERINGTON AVE., PHILADELPHIA 27, PA.

In Canada Supreme Power Supplies Limited, Toronto 14

Check 2149 opposite last page.

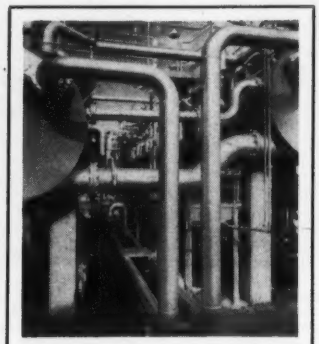
lic health and safety throughout the period of any potential hazard.

Estimates are that space requirements will not be large. Low-level wastes at Oak Ridge have been adequately handled for the past 15 years in approximately 60 acres. It is believed that similar wastes generated between 1960 and 1980 in the 16-state Northeast area could be safely stored in a 200 to 300 acre site.

Types of packaged low-level wastes to which the policy applies include broken glassware, paper wipes, rags, animal carcasses, laboratory paraphernalia and other similar items. Low-level liquid wastes are treated and disposed of at their points of origin.

High level wastes resulting from chemical processing of irradiated fuels will continue to be stored in underground storage tanks at facility where the fuel elements are processed.

(Information courtesy of Atomic Energy Commission, Washington 25, D. C.)



Twenty-six stages . . .

. . . of flash evaporation produce over 100,000 gpd of fresh water from sea water at this Pacific Coast plant. Evaporator is claimed to be world's longest. Main component measures over 70′ long and weighs 40 tons. Over eight miles of aluminum brass tube were used in the unit.

(Flash evaporator was manufactured by Cleaver-Brooks Special Products, 225 North Grand Ave., Waukesha, Wis.)

Check 2151 opp. last page.

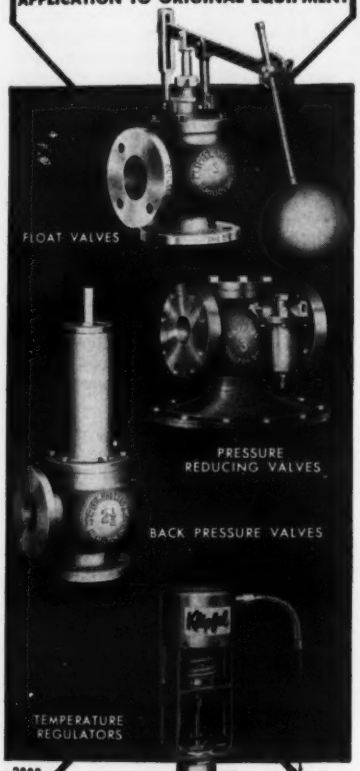
SINCE 1902 **Klipfel** VALVES

provide **AUTOMATIC CONTROL** of

TEMPERATURE • PRESSURE
FLUID LEVEL • FLOW

available for

STEAM • GAS • AIR • WATER
CHEMICALS
VISCOUS or ABRASIVE SLUDGES
EXPLOSIVE FLUIDS or VAPORS
APPLICATION TO ORIGINAL EQUIPMENT



2882

SPECIAL DESIGNS ENGINEERING

In writing for data please state your problem or describe your application. We will provide complete information.

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Check 2150 opposite last page.

for GRINDING AND DEHYDRATION FINER PARTICLES LOW MAINTENANCE

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The Fluid Energy "Jet-O-Mizer" Mill is designed and built by the pioneers in fluid energy fine grinding. It does more than produce fine particles. It controls fineness and product quality with a narrow distribution range and simultaneously with grinding can dehydrate, coat particles, blend and achieve chemical changes.

Jet-O-Mizer Mills are being used all over the world, processing many types of materials in the following industries:

• Abrasive	• Feed	• Pigment	• Wax
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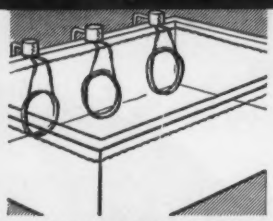
"Jet-O-Mizing" produces **FINE PARTICLES** ¼ micron average and above **PLUS** . . . Narrow Particle Distribution • Dry, or Controlled Moisture Content • Continuous Operation • Uniformity of End Product • Other Operations with Grinding • No Attritional Heat — No Moving Parts • Low Operating Costs • Low Maintenance

Send for complete information on Fluid Energy's "Jet-O-Mizer" Mills, "Jet-O-Clone" Dust Collectors, and TESTING AND CUSTOM GRINDING services.

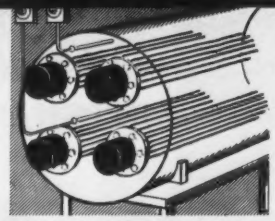
FLUID ENERGY PROCESSING & EQUIPMENT COMPANY
Richmond & Norris Streets, Philadelphia 25, Pa. • Phone: Regent 9-7728
(Formerly known as the Wheeler-Stephanoff Mill)

Check 2152 opposite last page.

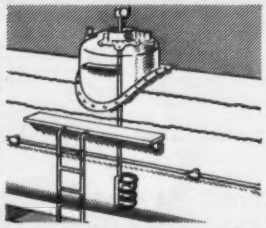
Call your CHROMALOX Man for heating answers



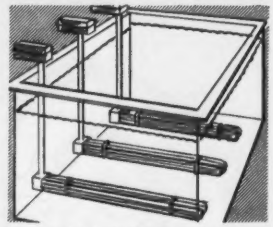
For plating applications, Chromalox CT Immersion Heaters are sheathed in lead, copper, stainless steel.



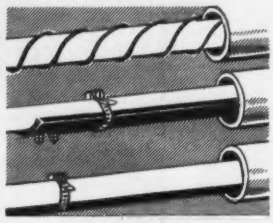
Water heating with TM flange-type Immersion Heaters mounted at one end of a tank.



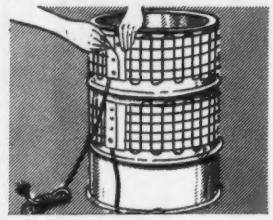
Heating viscous materials with BLCK Immersion Heaters before pumping from a railroad tank car.



Heating liquid held at constant level. TL Heaters generate heat parallel to the tank bottom.



Pipe heating with Chromalox Thermwire (300°F), Strip Heater (750°F) and Tubular Heater (1100°F).



Heat for 5- and 55-gallon drums. Just snap on and plug in. Protective coating resists abrasion, chemicals.

LIQUIDS? Only CHROMALOX heats so many things . . . so many ways

There's one best way to do any job. And you get the best results only by using that one best method.

Regardless of what your heating problems may be . . . your best chance of finding the best answer is to call your Chromalox Man.

- He represents more than 15,000 different types, sizes and ratings of electric heaters and heating elements . . . the world's largest line.
- He orders from the world's largest stock.
- And he is a *heating expert* . . . he understands your problem and can help you find the answer.

No matter what your heating problem is . . . solids, liquids or gases . . . call your Chromalox Man for the efficient, *electrical* answer. (*His phone number is listed at the right.*) Or, check the boxes below, write your name, title, and address at the bottom of this page and mail the coupon to us. Edwin L. Wiegand Company, 7500 Thomas Boulevard, Pittsburgh 8, Pa.

☐ Send me Catalog 60 (General Industrial heating applications).

☐ Have a Chromalox Representative contact me.

☐ Send me specific information on the heating problems I have outlined on the sheet attached.

☐ Do not have a Chromalox Representative contact me.

S1649

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MIDDLETOWN, CONN. Diamond 6-9606
MILWAUKEE, WIS. Broadway 1-3021
MINNEAPOLIS, MINN. Federal 6-6631
NASHVILLE, TENN. Cypress 2-7016
NEW YORK CITY, N.Y. (See Bloomfield, N.J.)
OMAHA, NEB. Atlantic 7600
PHILADELPHIA, PA. (See Bala-Cynwyd, Pa.)
PITTSBURGH, PA. Emerson 1-2900
PORTLAND, ORE. Capitol 3-4197
RICHMOND, VA. Atlantic 8-8758
ROCHESTER, N.Y. Hamilton 6-2070
ST. LOUIS, MO. Chestnut 1-2433
SAN FRANCISCO, CALIF. Underhill 1-3527
SEATTLE, WASH. Main 4-7297
SYRACUSE, N.Y. Granite 4-3933
WICHITA, KAN. Amherst 2-5647

CHROMALOX *Electric Heat* INDUSTRIAL · COMMERCIAL · RESIDENTIAL

Check 2153 opposite last page.

NEW LITERATURE

Ideas and New Trends

Over 80 films describing work simplification and industrial engineering techniques are listed in 24-page film rental library catalog. Film Cat — Industrial Management Society.

Check 2154 opposite last page.

Radioisotope laboratory designed for high school and college science programs is described in illustrated, four-page bulletin. Bibliography of articles related to training in radioisotope applications is also listed. Bul 131 — Nuclear-Chicago Corporation.

Check 2155 opposite last page.

High-strength steel, recently developed for tough applications and having good resistance to corrosion and abrasion is discussed in four-page bulletin. Chemical composition and mechanical properties are listed. Bul 651 — R. G. LeTourneau, Inc.

Check 2156 opposite last page.

Chemical processing of irradiated fuels is covered in 455-page book. Contents are based on proceedings of symposium held in October 1959 at Richland, Washington. TID-7583 may be obtained by remitting $4.50 direct to Office of Technical Services, Department of Commerce, Washington 25, D. C.

Missile and aircraft tube and duct joint design information is included in 40-page catalog. Both liquid and air systems are covered. Aircraft & Missile Cat 800 — Marman Div., Aeroquip Corp.

Check 2157 opposite last page.

Sludge collectors are topic of 28-page book. Full line is described for use in water, sewage and industrial waste treatment systems. Book 2546 — Link-Belt Company.

Check 2158 opposite last page.

Science teachers' opinions of current school administration practices in planning school science facilities are reported in six-page document. Results are based on survey conducted among some 500 teachers throughout the 50 states. "K-12 Science Teacher Opinions" — Scientific Apparatus Makers Association.

Check 2159 opposite last page.

Research highlights of work conducted by National Bureau of Standards during 1959 is reported in 169-page publication. Publication 229 may be obtained by remitting 55 cents direct to Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

THAT'S INTERESTING

One-package epoxy mix

Preparation and handling of epoxy formulations is simplified with package which contains all ingredients ready for mixing. Component with higher specific gravity, usually resin, is measured into container first. Then lower specific gravity material—amine—is added. A cured epoxy film forms at interface separating components until they are to be used. Then film is broken by inserting spatula and components are mixed.

Smog traced to olefins

Olefinic hydrocarbons have been identified as a smog-producing element in motor vehicle exhaust gases, according to the Air Pollution Foundation. Other hydrocarbons have been absolved by study.

For more information on product at right, specify 2160 see information request blank opposite last page.

WHO FORGES THE TOUGH ONES? & machines them, too

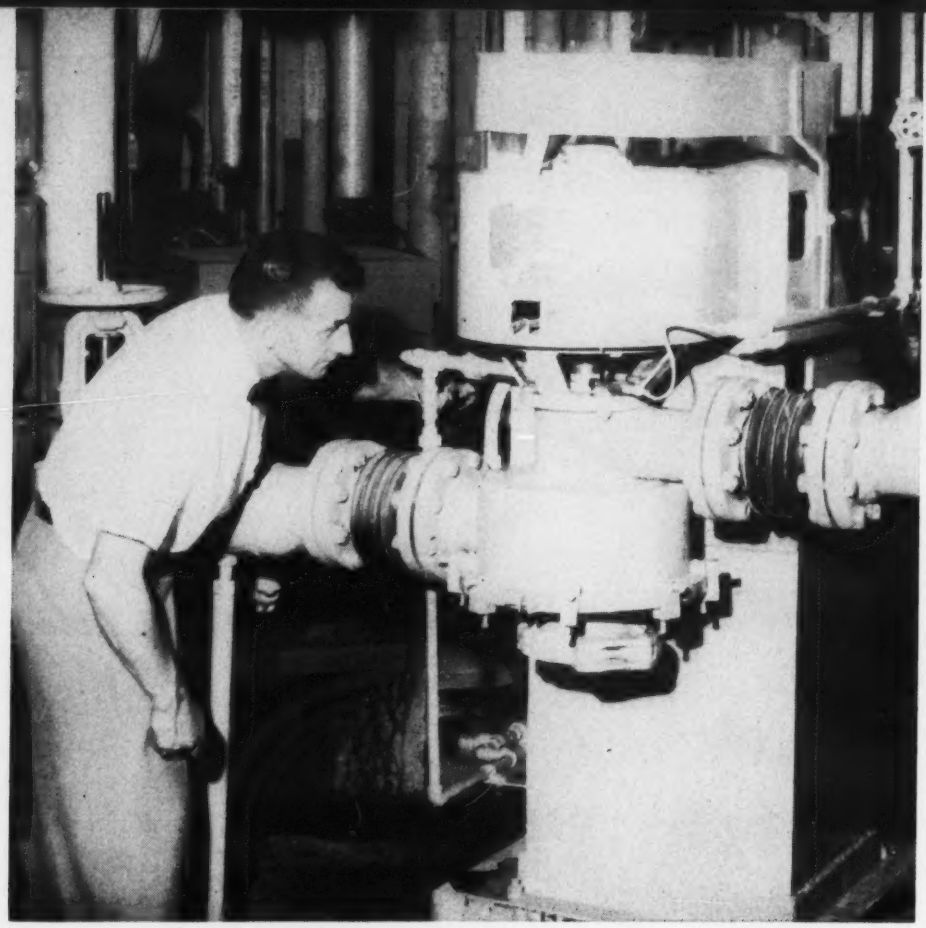
Assume that you've just designed a high pressure cylinder to be used in the production of high energy explosives. It is a good sized forging—the main cylinder is 50¼″ long, 31½″ O.D., and 18″ I.D.—with high physicals. It must be forged of a highly alloyed chromium nickel molybdenum vanadium steel to obtain a tensile of 164,000 psi . . . a yield point of 153,000 lbs. . . . and hydrostatic test at 30,000 psi.

Naturally, you prefer one responsible source to do the whole job—one organization to melt the steel, forge, and finish all parts to exact prescribed tolerances.

So, call on National Forge, a company that's been producing big forgings for over 40 years—from melting steel through finish machining and protective coating (dulite, in this case) all in one completely integrated plant. Let us quote on your next job for big machined forgings—and demonstrate the answer to "who forges and machines the tough ones . . . best?

NF NATIONAL FORGE COMPANY
IRVINE, WARREN COUNTY, PA.

For more information on "the tough ones," and the machinery that makes them "best"—write for Bulletin NFO.



Compact, vertical mill makes sure that there are no lumps in slurry going to spray dryer. Unit processes about 56,000 lb feed per hr. Bellows mounted on inlet and outlet connections absorb vibrations from positive displacement pumps serving the system

Photos by CP Staff

Reaping double benefits for detergent plant, compact mill . . .

• Stops spray dryer nozzle clogging
• Improves pump operation

TED F. MEINHOLD, Associate Editor
with **J. L. HERIN,** Plant Engineer
and **R. NORRIS,**
Chief Project Engineer,
Colgate Palmolive Company
Jeffersonville, Indiana

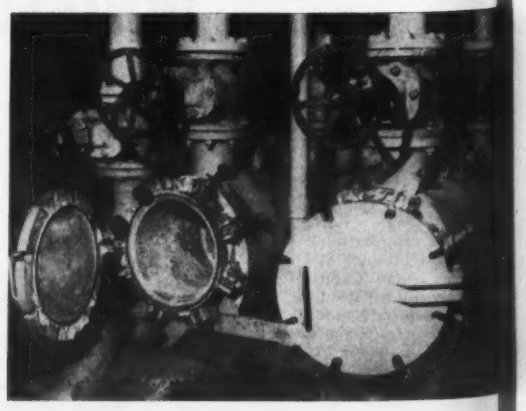
Problem: Lumps in detergent mix feed caused nozzles to clog on huge 28′ diam x 80′ high spray dryer at Colgate-Palmolive Company, Jeffersonville, Indiana. This not only interfered with production, but also resulted in excessive pressure fluctuations and undesirable back-pressure being exerted on the three big positive-displacement pumps serving the installation.

High-pressure strainers installed to guard against these conditions were not too successful. Approximately 56,000 lb of detergent slurry are processed through the dryer each hour.

Among the detergents produced at the Jeffersonville plant are Fab, Vel, and Super Suds. Typical formulation is made up of seven or eight different ingredients. These generally consist of an active detergent base, phosphate builders, scrap, anti-deposition ingredients, and sodium sulfate. Most of the lumps are caused by the phosphate builders and sodium phosphate.

Solution: Based on previous experience with a similar machine, company installed a heavy-duty, vertical mill ahead of the spray dryer. Available in combinations of cast iron, carbon steel, and

Space-hogging strainers have been pulled out of service. Units used to present quite a maintenance problem



stainless steel, all working parts are overhung from the bearing housing resulting in a compact design suitable for many applications.

Product disintegration is accomplished by series of hammers mounted on 6" diam rotor whirling at high speed inside a 360° circular screen. Source of power is 20 hp, 1750 rpm motor. Rotor's shaft is connected to motor by means of belt drive. All components are integrally housed and mounted on 26"x23" concrete base. Overall height is only about 60".

Slurry enters mill through 4" flanged inlet, passes downward, is delumped through screen perforations by the revolving hammers, and discharges out through 4" flanged outlet. Unit operates completely flooded. Capacity is determined by pumping rate on discharge side.

Both the inlet and outlet connections of mill are fitted with stainless steel, bellows-type, expansion joints which absorb the pump vibrations.

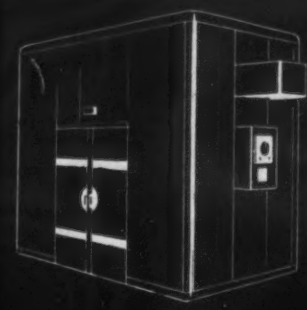
Packing gland at top of grinding chamber is cooled and flushed with 14 psi water. Thermal switch on water line cuts off detergent feed to mill in case of overheating. Pressure switch is also installed on water line. This stops the feed if cooling water pressure drops too low, or water line becomes plugged.

Results: The mill has satisfactorily solved the spray nozzle clogging problem and minimized pressure fluctuations through the positive displacement pumps. Latter now operate smoother, need less attention, and give more reliable performance.

Use of power strainers with their inherently high maintenance requirements has been completely discontinued. Cleaning the new mill is a relatively simple task. This is done about once a week—usually on Monday morning. Cover from dirt collection

To page 161

"NATIONAL" PROVIDES
THE *Economical Solution*
TO *Any Drying Problem!*



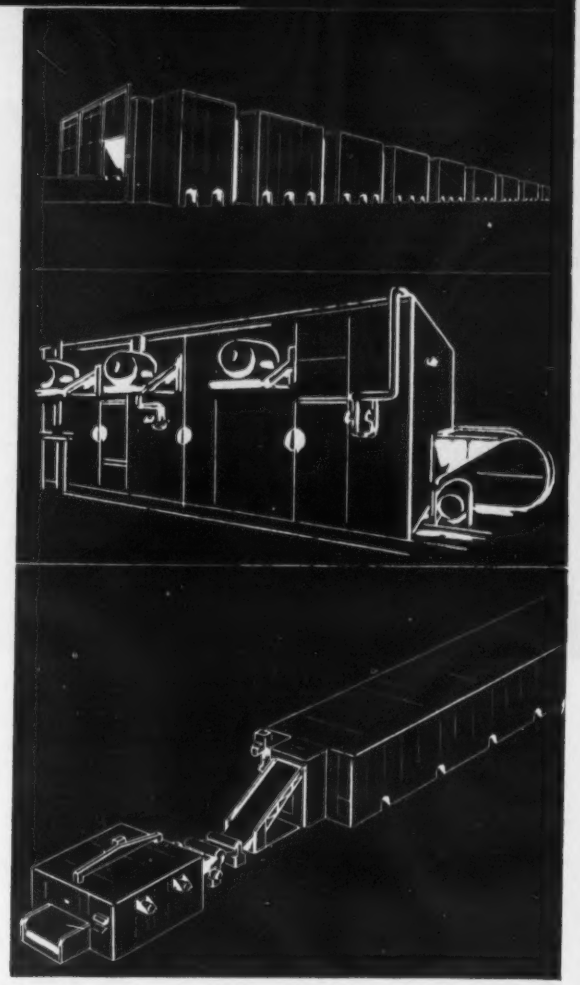
No matter what your product may be, it can be dried or otherwise processed at a lower cost per pound or other unit, in one or more of the various types of "NATIONAL" equipment.

High-speed production; maximum effective use of the drying medium under finely adjusted control; adaptability to existing plant conditions and future expansion; and the assurance of long, trouble-free operation are among the important reasons why "NATIONAL" machines are being erected in more and more chemical plants throughout the United States and in other countries.

"P-4" CONSTRUCTION. The result of a radically new approach to simplified Dryer construction, "P-4" Construction provides a precision-built, prefabricated structure, with trussed-and-tensioned insulated panels. It assures a more rigid, durable machine, with installation time in your plant reduced as much as 50%.

"ADD-A-UNIT" DESIGN. This unique accomplishment of "NATIONAL" engineering provides alternatives which are both practical and economical—(1) simplification of the initial installation based on present requirements; (2) maximum adaptability to step-by-step future expansion.

OTHER SPECIAL FEATURES. Patented Super-Power Fans, made in our own shops to specifications developed through years of industrial drying experience. Patented Indexing Orifices, Turning Vanes and other devices and arrangements assure unequalled versatility and precision in air distribution and control. The heat source may be steam, gas, oil or other medium.

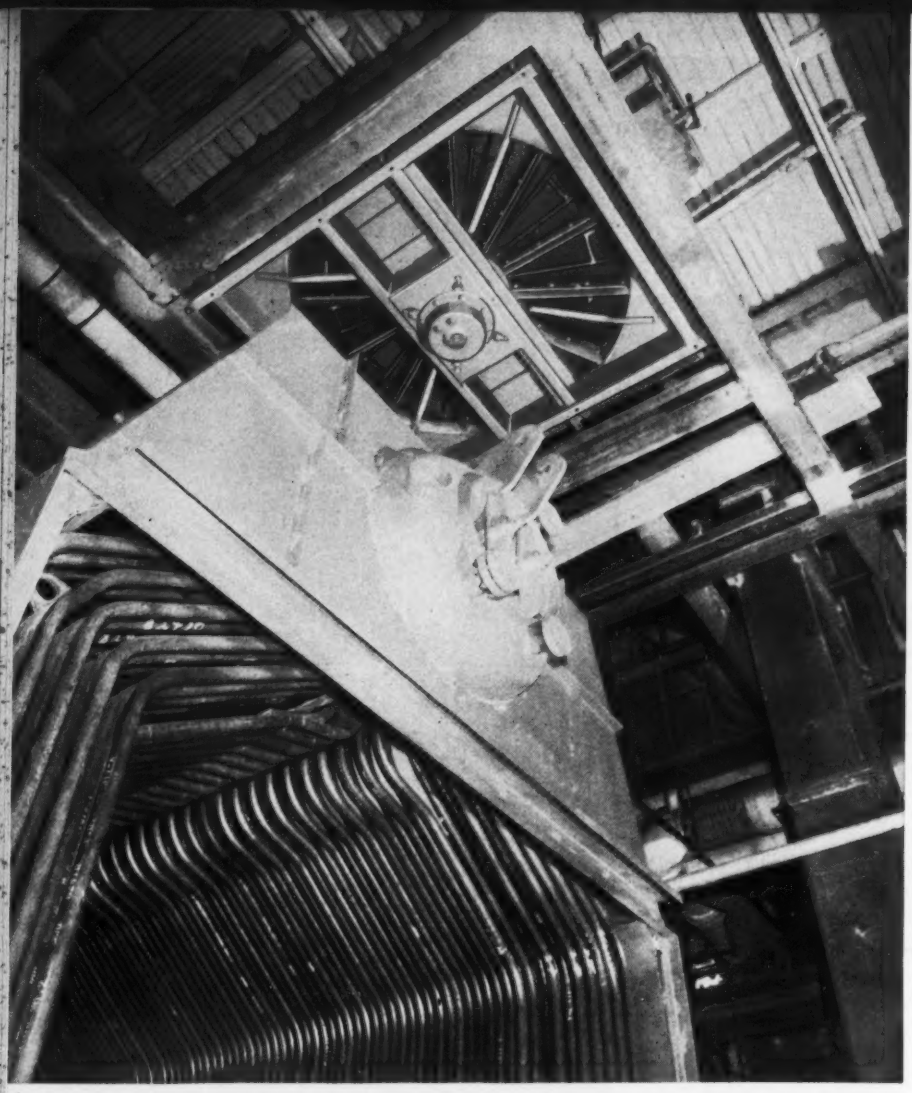


When you have a *new* product which presents a drying problem, or if you want to improve your present drying processes, call "NATIONAL" Engineers for consultation. It is your surest way to improved producton and lower over-all costs.

THE NATIONAL DRYING MACHINERY COMPANY
LEHIGH AVE. and HANCOCK ST., PHILADELPHIA 33, PA.

New England Agent: JONES & HUNT, INC., Gloucester, Mass.
Southern Agent: HAYES TEXTILES, INC., Spartanburg, S. C.
Cable Address: "NADRYMA"—W.U. Code

Check 2161 opposite last page.



The Ljungstrom Air Preheater at the B. F. Goodrich Company Shelton Plant is installed directly over the 65,000 lb/hr Wickes boiler. Flue gas leaving the boiler at 615°F passes through the circular rotor, which absorbs the heat and releases it into the incoming air. Preheated combustion air improves combustion, makes fuel burn cleanly. This Package Air Preheater was factory-assembled, and requird only 100 manhours to install.

At B. F. Goodrich Co.'s Shelton Plant

Air Preheater boosts combustion air temperature 345°F... gives 6% more thermal efficiency

"Only a Ljungstrom® Air Preheater, with its continuous regenerative principle, could meet our requirements", says A. G. Sandomirsky, Manager of Engineering at the B. F. Goodrich Company, Shelton, Conn., plant. "We produce foam rubber 24 hours a day, five and six days a week. With an Air Preheater we can meet process steam requirements more economically, and an Air Preheater helped us to justify the installation of high efficiency, high pressure equipment for by-product power generation."

Here's why the Shelton plant meets its requirements best with a Ljungstrom Air Preheater:

1. Ljungstrom is the most efficient heat exchanger you can buy. The Ljungstrom rotor revolves continuously through the flue gas and incoming air, thus absorbing heat and releasing it *from the same surface*. Since the heat doesn't have to pass through anything, each inch of rotor surface is as efficient as one foot of a tubular recuperator.

2. Ljungstrom is the most reliable heat exchanger you can buy. All heat exchange elements pass through the entire air and gas streams. The temperature of the elements in the coolest region – where fresh air enters – is actually an average of the gas and air temperatures, so it's consistently higher than the coolest point in a recuperative heat exchanger. Result: no cold spots, less chance of moisture formation.

3. Ljungstrom is easiest to maintain. You can inspect it – and clean it–while it's running. Heat exchange elements are divided into modular baskets that can be replaced individually without disturbing the other elements. You can even reverse the elements if the surface has thinned on one edge, effectively doubling the life of the heat exchange surface.

For more information on the Ljungstrom continuous regenerative principle, or on the Air Preheater that meets your requirements, phone MUrray Hill 2-8250 or write to The Air Preheater Corporation.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

WHY BORROW?

You can receive a personal copy of CHEMICAL PROCESSING every month.

Do you know that the magazine can come to you personally without charge, to your designated address?

If you . . .

would like to receive it and if you qualify, the publisher will add your name to the more than 50,000 key men in the chemical processing industries who receive each issue regularly.

The necessary qualifications are outlined on the request form that can be found opposite the inside back cover.

Fill it out, being sure to give all necessary information, and mail to Reader Service Department.

Perhaps . . .

others in your company would also like to receive CHEMICAL PROCESSING personally each month. Include their names on the form opposite the back cover.

Your application for subscription is welcomed.

For more information on product at left, specify 2162 see information request blank opposite last page.

Disintegrator

From page 159

chamber on bottom of mill is easily removed, contents taken out, and cover replaced. Total shutdown period is only about 30 minutes.

The mill was installed in the summer of 1958 and has required little, if any, maintenance. The unit is lubricated and inspected at regular intervals.

(Model RI2-6-P221 Disintegrater was manufactured by Rietz Manufacturing Co., P. O. Box 690, West Chester, Pa.)

Check 2163 opposite last page.

Sludge collector's design cuts tank volume needs by 25 percent

Two additional series of sludge collectors for water, sewage and industrial waste treatment settling tanks have been announced by Link-Belt Company. The first series consists of settling tank having rapidly sloping bottom, tank-type sludge collector and multiple effluent weirs. Sloping bottom permits volume of tank to be cut by 25% or more without reducing surface area or overflow rate. Considerable savings can be realized in construction costs.

The other series are aeration sludge units for pre-aeration and settling applications. Collector consists of single circular tank in which both of these operations can be performed. Collecting mechanism removes solids from aeration and settling compartments.

(Further information about Circuline sludge collectors is available in Book 2546, which may be obtained from Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Ill.)

Check 2164 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Some Straight Talk On Steam Trap Capacity

. . . or pulling away the curtain of confusion that surrounds steam trap capacity ratings.

Unfortunately, for the steam trap buyer, the subject of steam trap capacity has become cloudy and confused by a landslide of claims, counter-claims and inconsistent "standards" for measurement. So let's take a cold hard look at this subject so vital to the efficient operation of your plant.

What Determines Steam Trap Capacity?

There are three factors that determine the capacity of a steam trap:

1. The area of the orifice.
2. The density of the condensate.
3. The pressure differential across the trap.

Let's take a closer look at each of these:

Area of orifice is usually specified by the trap manufacturer or can be calculated from the diameter. Nothing complicated here.

Density of condensate depends on temperature. A cubic foot of cold water weighs 62.4 lbs. At 250° F. or 15 psi, it weighs less than 59 lbs. This is important. Don't overlook it.

Pressure differential across the trap is most significant. And it is complicated by the many factors that affect it, such as:

1. Pressure drop between unit drained and the trap when the trap valve is open.

2. Distance the trap valve is moved from the valve seat.

3. Back pressure on the trap with orifice closed; i.e., return header pressure.

4. Increase in back pressure produced by condensate and flash steam flowing in the discharge line. This in turn is affected by the diameter and length of the discharge line, plus friction caused by valves and fittings.

Orifice Capacity Vs. Steam Trap Capacity

Figure 1 shows a ½" diameter sharp-edged orifice at the end of a pipe filled with cold water at 15 lbs. pressure. The capacity of this orifice, using a .61 coefficient of flow would be 8,800 lbs. per hr. Now, would this ½" orifice if used in a ¾" steam trap installed as shown in Figure 2 provide the trap with a continuous discharge capacity of 8,800 lbs. of hot condensate per hour? The answer is

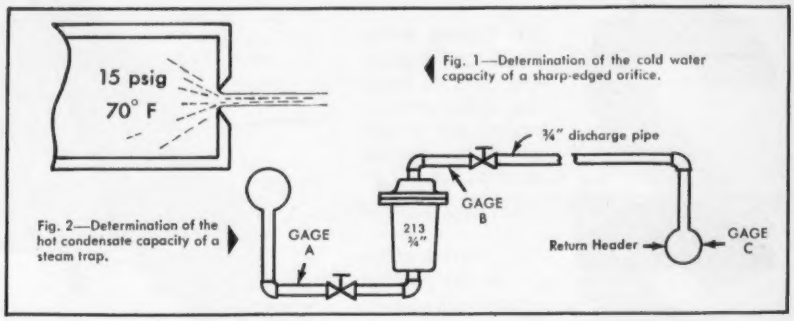


Fig. 1—Determination of the cold water capacity of a sharp-edged orifice.

Fig. 2—Determination of the hot condensate capacity of a steam trap.

"no". And here are some of the reasons why:

Density of condensate. As pointed out above, cold water weighs 62.4 lbs. per cu. ft. At 15 lbs. pressure and 250° F. water weighs less than 59 lbs. per cu. ft. This difference in density alone reduces the lbs. per hour capacity of the orifice by over 5%.

Pressure differential across the trap. With the trap valve closed we have a static pressure differential of 15 psi. The trap valve must be able to open against this pressure. However, this is not the pressure differential that will determine the capacity of the trap valve.

The ¾" discharge line will be full of a mixture of flash steam and condensate. To keep this mixture flowing from the trap outlet to the return line requires a pressure differential. In actual capacity tests run as shown in Figure 2 Gage B at the trap outlet registered 11 lbs. back pressure. Thus the true pressure differential across the trap was about 4 lbs. Under these conditions the measured capacity of the trap was 4,340 lbs/hr. or just about half of the capacity of the ½" orifice for cold water.

How Armstrong Determines Capacity Ratings

Armstrong trap capacity ratings are based on hundreds of tests under actual operating conditions. In these tests, the condensate used was at the steam temperature corresponding to the test pressure. Thus, the capacities determined take into account the pressure drop that occurs when the trap orifice opens and the choking effect and back pressure of the flash steam. Actual installation hook-ups were used so that pipe friction in both inlet and discharge lines as well was reflected in the results.

Let's go back to the example cited above and in Figure 2. The trap referred to is an Armstrong No. 213. While it did test out at 4,340 lbs. per hour for a static pressure differential of 15 psi, it is rated in the catalog at only 3900 lbs. per hour for this pressure—just to be on the safe side.

For the trap buyer, this means that Armstrong Steam Trap capacities are based on handling condensate at steam temperature for the stated static steam pressure differential under actual working conditions.

Capacity ratings which don't take into account all of the variables will be misleading and may lead to the selection of undersized traps. So whenever you specify or buy traps be sure that the capacity ratings you work from are realistic. One way to be sure is to select Armstrong Traps with *guaranteed* capacity ratings.

* * *

Additional information on trap capacity ratings, plus data on how to correctly size, install and maintain steam traps for any pressure, any temperature and any load, are presented in the 48-page Armstrong Steam Trap Book. Ask your local Armstrong Representative for a copy or write:

Armstrong Machine Works
8805 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

See our Catalog in Chemical Engineering Catalog

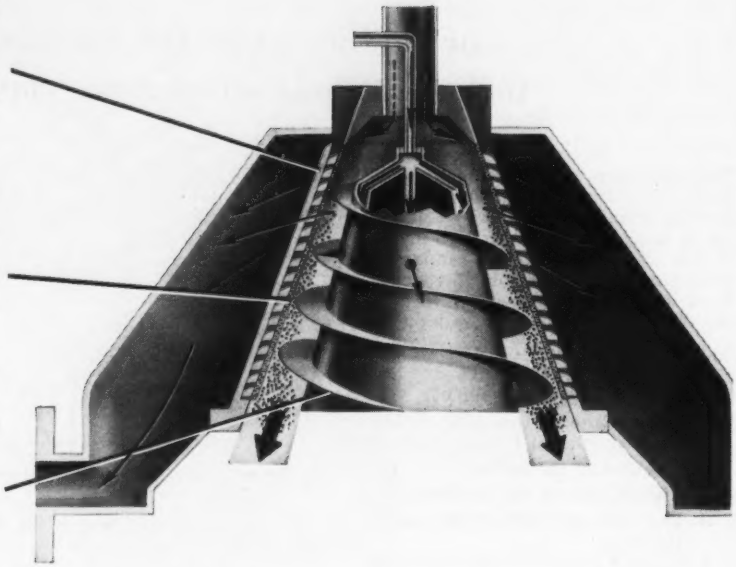
Check 2165 opposite last page.

3

the separating action of high centrifugal force (1800 x G) as the conical bowl assembly rotates at high speed.

the filtering action of the special perforate plate on which the solids are deposited and through which the mother liquor passes.

the metering action of the differential volute which controls the flow of solids downward at desired proper rate.



forces act on your slurry at the same time in the Sharples Continuous Dehydrator

For deliquefying crystalline solids and fibrous pulps at high capacity, Sharples offers 4 sizes of the Continuous Dehydrator with solids handling capacity up to 70 tons or more per hour.

A wide range of variables is inherent in the design and operation of this centrifuge; refinements which reflect in superior performance on each specific material.

The Sharples Continuous Dehydrator has proved to be an effective and profitable answer in numerous high capacity dewatering jobs. Get in touch with Sharples . . . specialists in making the most of solids from slurries.

We'll gladly send literature on the Continuous Dehydrator.

THE SHARPLES CORPORATION

Centrifugal and Process Engineers

2300 WESTMORELAND STREET / PHILADELPHIA 40, PENNSYLVANIA

NEW YORK · PITTSBURGH · CLEVELAND · DETROIT · CHICAGO · HOUSTON · SAN FRANCISCO · LOS ANGELES · ST. LOUIS · ATLANTA

Associated Companies and Representatives throughout the World

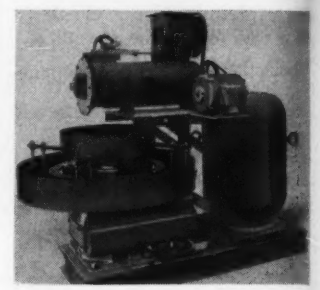
Check 2166 opposite last page.

Heavy-duty pellet mill has horizontal head, stationary dies

Uses: Densifying and extruding dry and low-moisture powdered, granular and fibrous materials in chemical and allied industries.

Features: Mill has horizontal head with stationary pelleting dies. Low rpm minimizes wear.

Description: Heavy-duty pellet mill is designed for continuous operation. Unit permits maximum production with minimum power consumption. Mill is capable of producing pellets up to 2" long, having from ⅛ to 1" diam. Accurate pellet length control is achieved by adjustable cutters.



Pellet mill produces pellets up to 2" long, having ⅛ to 1" diam

(Pellet mills are product of Industrial Division, Daffin Manufacturing Co., Lancaster, Pennsylvania.)

Check 2167 opposite last page.

Both blending, drying performed in packaged twin-shell processor

Uses: Blending and drying wide variety of chemicals.

Features: Packaged unit is a combination twin-shell liquid-solids blender and tumbling vacuum dryer. Design speeds processing and minimizes material handling requirements.

Description: Dry ingredients may be charged through either one of two openings at end of shells. Solids can be tumbled under vacuum, pres-

sure or heat to achieve optimum results. Liquids are introduced through spinning cylindrical liquid dispersion bar. Equipped with dispersion discs, bar assures uniform distribution of liquids.

When desired amount of liquid has been added to

Jacketed unit is equipped for liquid-solids blending, drying, and solvent recovery

batch and blending cycle is complete, operator actuates pushbutton to start drying cycle. Drying conditions can also be accurately controlled by vacuum, heat or tumbling conditions. Separately-actuated agitator bar can be used, if necessary, to break up any agglomerated particles.

Equipment is available in working capacities ranging from one to 50 cu ft. Shell is completely jacketed. Standard equipment includes vapor take-off connection, condensers, receivers, pump and instruments.

(Packaged solids processor is product of Patterson-Kelley Co., Inc., East Stroudsburg, Pennsylvania.)

Check 2168 opposite last page.

Correction

In our February issue, in announcing the Dustex Roto-Jet dust collector (page 133), we reported that these units were available in three sizes with the following capacities: 1000, 1500 and 2000 cfm. We failed to mention that multiples of these units could handle vastly greater volumes. For example, ten of the large collectors connected in series could have a capacity of up to 20,000 cfm. For further information on such installations contact Dustex Corp., P.O. Box 2520, Buffalo 25, N.Y.

Cracking tough heat exchanger problems is what we do best

For more than 40 years, American-Standard* Industrial Division engineers have specialized in designing and making heat exchange equipment for virtually all conditions and applications. Drawing upon this vast experience, American-Standard Industrial Division can base recommendations upon precedents of proved success. And, in many instances, our comprehensive standardization paves the way for savings in cost and time. Get the full story on American-Standard heat exchangers. Send for Bulletin 0.4A9 today. American-Standard Industrial Division, Detroit 32, Michigan.

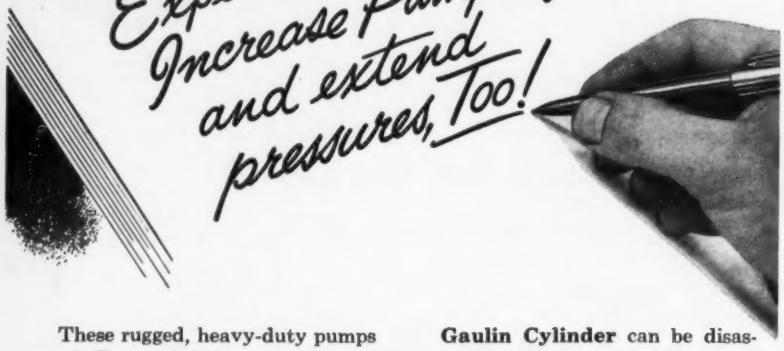
*American-Standard and Standard ® are trademarks of American Radiator & Standard Sanitary Corporation.

American-Standard
INDUSTRIAL DIVISION
AMERICAN BLOWER PRODUCTS • ROSS PRODUCTS • KEWANEE PRODUCTS

Check 2169 opposite last page.

GAULIN TRIPLEX PUMPS

Turn in Lower Operating Expense Accounts... Increase Pumping capacity and extend pressures, Too!



These rugged, heavy-duty pumps are built to minimize operating, inspection and maintenance costs. They handle large volume of all types and densities of fluids.

Horizontal Design provides well area separating product from crank case.

Well Area can be gasketed for maintaining sterility . . . or for inert compatible chemicals (gases or liquid) for hazardous materials.

Gaulin Cylinder can be disassembled in minutes. Capacities from 50 to 6500 GPH . . . pressures from 500 to 12,000 psi.

Write for Bulletin P-55. At the same time ask for GTA . . . Gaulin Technical Assistance . . . for experienced advice and factual data on the best method to move or blend your product.

Check chemical engineering catalog for representative nearest you.

Send for the GTA library of product information.

Gaulin TRADE MARK
MANTON Gaulin
MANUFACTURING CO. INC. EVERETT, MASS.

55 Garden Street, Everett 49, Mass.

World's largest manufacturer of stainless steel reciprocating, rotary, pressure exchange pumps, dispersers, homogenizers and colloid mills

Check 2170 opposite last page.

Non-woven metal belt patented for use on drum filters

Constructed of series of rigid, wedge-shaped bars

Flexible, non-woven metallic belt has been patented for use on drum filters. Made up of rigid, wedge-shaped bars, each bar has several circular eyes. Belt is assembled by means of flexible wire or coil spring strung through eyes.

During cake formation and drying on filter drum, bars are close together to insure good cake and clear filtrate. When belt passes around filter discharge roll, coil springs flex and bars spread apart to aid cake discharge.

(Non-woven metallic filter belt was developed by The Eimco Corporation, P. O. Box 300, Salt Lake City 4, Utah.)

Check 2171 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Low power, maintenance features of continuous dewatering press

Can handle up to 20 tons wet feed per hour

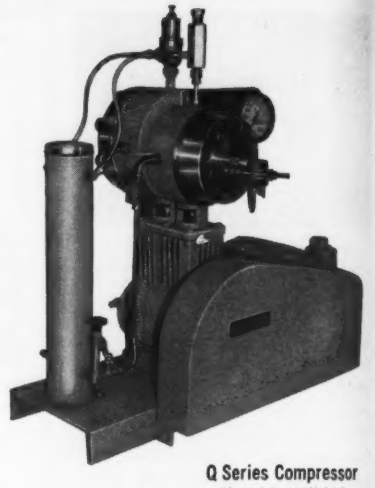
Uses: Continuous dewatering of semi-solid materials in chemical, food and allied industries.

Features: Operating cost of press is comparatively low. Power required is from five to 25 hp, depending upon material being processed. Machine can handle 20 tons feed per hr and dewater up to 55% solids.

Description: Continuous dewatering press is designed to process any material (with free moisture) that is fibrous enough to pack. Product enters press at top from a feed tank, hopper or conveyor and drops between large revolv-

NEW

Q-SERIES TWO-STAGE Diaphragm Compressors



Q Series Compressor
(4 models available)

Performance

Suction.....0 to 250 p.s.i.g.
Discharge...1,000 to 5,000 p.s.i.g.
Capacity.....0.25 to 4.25 s.c.f.m.

Advantages of Vertical Head Design

High overall compression ratio
Space saving
Portable
Easy priming

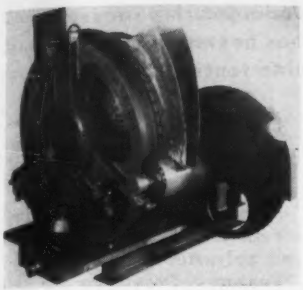
These laboratory and pilot plant two-stage compressors have a built in relief valve in each head. The stainless steel heads are water cooled when necessary. Furnished complete with explosionproof motor, belt guard, hydraulic reservoir, interstage pressure gauge and rupture assembly, steel base, pressure gauge, suction and interstage filters and all necessary piping.

Write for Bulletin 5 C for Series Q data.

Ask about other PPI 1 to 4 stage compressors.

PRESSURE PRODUCTS INDUSTRIES, INC.
Hatboro, Pa. OSborne 5-1600
Manufacturers of laboratory and pilot plant pressure equipment

Check 2172 opposite last page.



Dewatering press is designed for continuous, rugged service. Unit requires little attention other than occasional lubrication

ing discs, sides of which come close together while rotating, forming cone.

Resulting pressure extracts water which leaves press at bottom. Dewatered product is discharged continuously at back of press. Unit operates at one-half to one rpm.

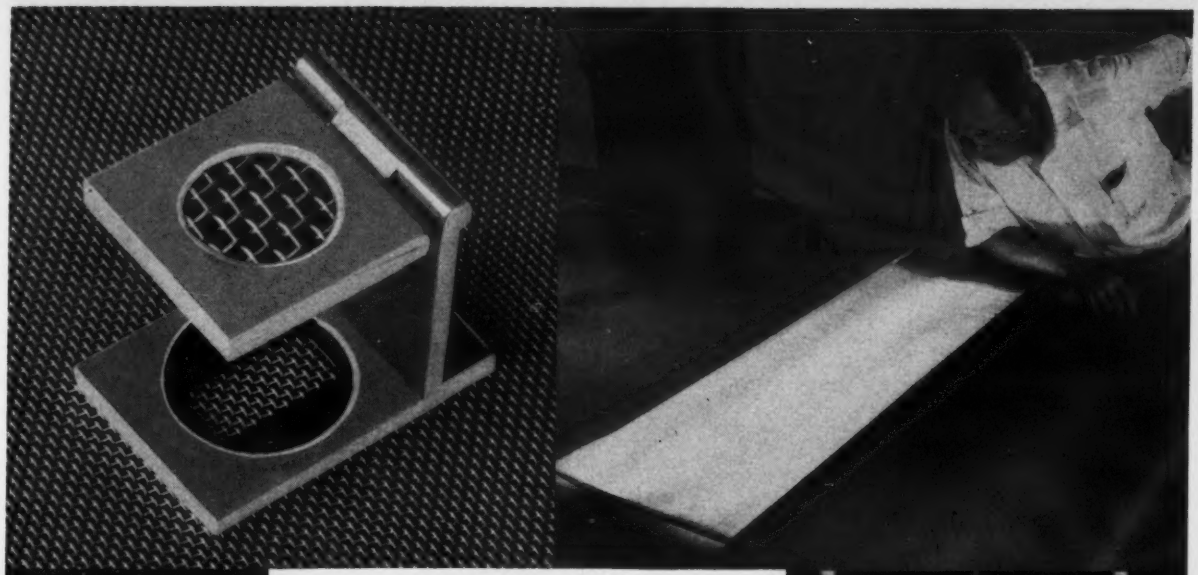
Units are available in three, four or five foot diam (press wheels) sizes. Largest press measures approximately 91 x 88 x 82" high.

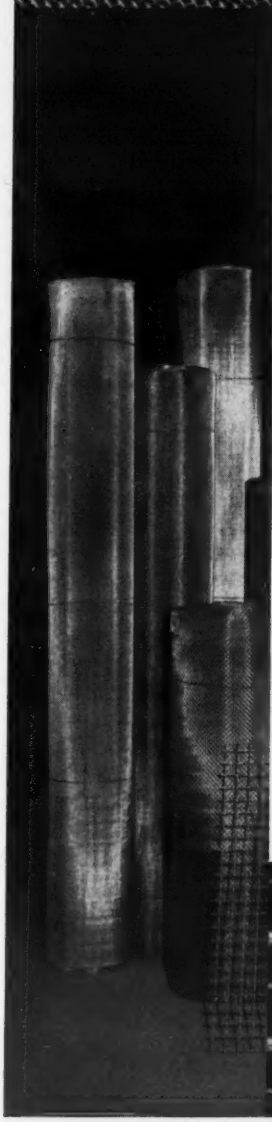
Machine is designed to operate continuously with little maintenance. Press wheels are open on the side to simplify washing and cleaning. Unit has minimum of moving parts. Dewatering screens are renewable and easy to replace.

(Further information about continuous dewatering press may be obtained from P & L Manufacturing Company, Inc., 517 E. La Palma Avenue, Anaheim, Calif.)

Check 2173 opposite last page.

L. MILLSTEIN, E. R. SQUIBB & SONS





Who counts 'em?

CAMBRIDGE does . . .

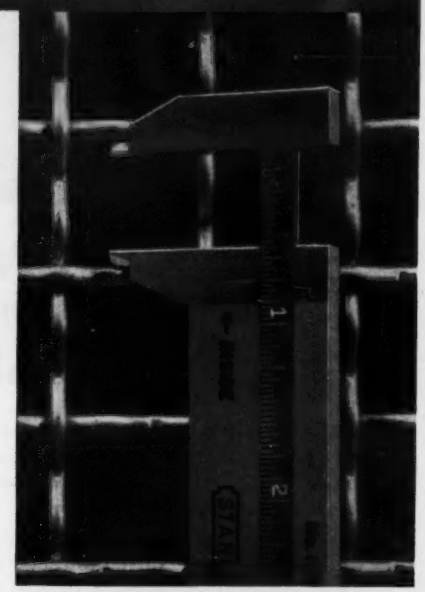
. . . because *exact* mesh count and mesh size are the trademarks of Cambridge INDUSTRIAL WIRE CLOTH.

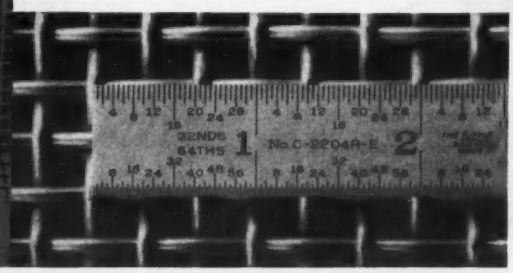
But, quality isn't the whole story. When you call Cambridge for industrial wire cloth, you also get service . . prompt answers to your inquiries . . . quicker deliveries . . . and an experienced Field Representative who follows up your order to make sure our product is giving you the best possible service. Let us quote on your wire cloth needs. We manufacture wire cloth from any metal or alloy—including titanium—in nine basic weaves. Very likely, we have what you require in our warehouse right now. For samples or more information, call your Cambridge Field Engineer...he's listed in the yellow pages under "Wire Cloth". Or, write for FREE 94-PAGE CATALOG.

The Cambridge Wire Cloth Co.

Department F • Cambridge 5, Md.

Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications





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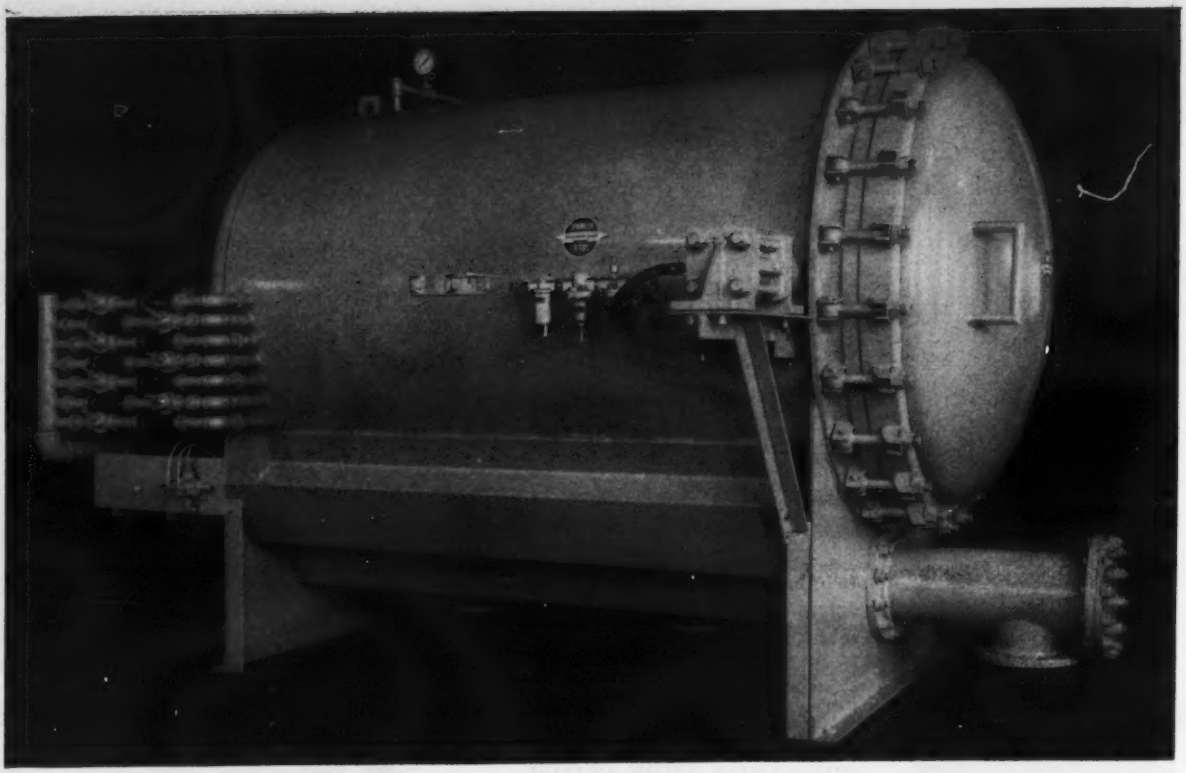


A NEW AUTOMATIC FILTER

Has horizontal plate cake stability plus automatic cake discharge

SPARKLER Model HRC

Filters with plates in horizontal position thus assuring complete cake stability, no danger of cake cracking or breakthrough under any operating condition or even with complete shut down.

To clean; cake is blown dry. Each plate operating with individually valved outlets and sight glass. Then plates are rotated to vertical position and the cake drops off with the aid of a vibrator and is expelled by a worm screw in the bottom of the tank in semi dry state or can be furnished without screw for liquid slurry discharge. The complete cleaning operation is performed without opening the filter, a completely enclosed system.

All operations of the filter including precoating and cleaning can be fully automated.

Write for complete information

Diagram of operating position of plates during precoating, filtering, and blow down. Horizontal position assures positive cake stability.

Sight glass for each plate is provided on outlet to give a continuous check on clarity during filtering and to determine when cake is dry during blow down.

Individually valved outlet for each plate.

The exclusive Sparkler plate construction gives unrestricted flow through the filter plate. Uniform, full support of the filter media eliminates mechanical breakage.

Flexible non-corrodible tube connecting each plate with individual outlet. Flexibility of this connection permits rotating of the plate assembly for cleaning.

Diagram of operating position of plates during cleaning, with plates rotated to a vertical position.

Dry cake falls off vertical position of plates and drops into trough bottom to be expelled with screw conveyor.

Vibrator rod connects through tank wall with linkage on plates to drop cake.

SPARKLER FILTERS

SPARKLER MANUFACTURING COMPANY · Conroe, Texas, U.S.A.

Check 2175 opposite last page.

Foam pouring conveyor has heated belt surface, side fences

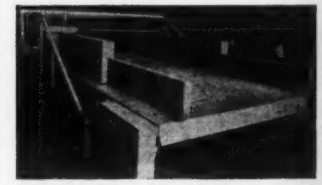
Automatic belt takeup compensates for temperature changes

Uses: Producing continuous sheets of urethane, polyether and polyester foams.

Features: Provisions for hot air heating is made in both conveyor and side fences for warming the foam blanket.

Description: Continuous foam machine consists of metal belt conveyor in a truss support. Unit is pivoted at pouring end and is equipped with handwheel-operated mechanism to adjust conveyor slope. Pouring end has side fences to support pouring paper. Spacing between fences is also adjustable.

Remote-controlled variable-speed drive permits operator to change conveyor speed



Continuous foam-forming machine has 80"-wide zinc-coated conveyor belt

during operation. Automatic takeup compensates for temperature changes. Conveyor belt is zinc-coated which simplifies cleaning.

Eighty-ft long unit has working width of 80" with minimum fence spacing of 24". Fences are 30' long, with additional removable 10' section in foaming head area.

(Armorbelt foaming conveyor is product of M-H Standard Corporation, 517 Communipaw Ave., Jersey City 4, N.J.)

Check 2176 opposite last page.

Packaged heat transfer system for supplying heat to jacketed kettles and similar equipment is subject of four-page bulletin. Unit is electrically heated, can provide temperatures up to 600°F. "Per-Fab Heat Transfer System" — Per-Fab Company, Inc.

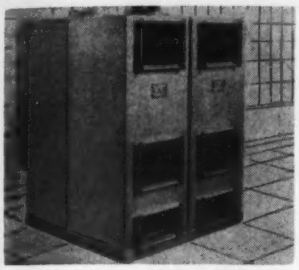
Check 2177 opposite last page.

Compact fume scrubber operates on interface reaction principle

Wet-bed packing achieves high gas-liquid contact.

Uses: Removing fumes and dust from exhaust gases in chemical and allied fields.

Features: Scrubber operates on interphase reaction principle. High absorption efficiencies are reported to be



Twin 200 cfm scrubbers processing fumes from nitric and sulfuric acids

obtained in minimum space through use of wet-bed packing kept in flooded condition.

Description: Scrubber is a packaged, self-contained unit having two packed and flooded reaction beds which subdivide chamber into three plenums. Liquid enters at top of scrubber and flows downward through reaction beds. Gas or air being processed enters at bottom, flows upward through two beds.

Liquid requirements are about four gpm per 1000 cfm. Flow can be adjusted to meet process requirements. Static head is 3 to 12" wg, excluding flow through ductwork.

Scrubbers are available in capacities ranging from 25 to 5000 cfm. Multiple units may be connected together for greater capacity. Scrubbers have been successfully tested on hydrochloric, sulfuric, nitric and hydrofluoric acid fumes, and many other chemicals.

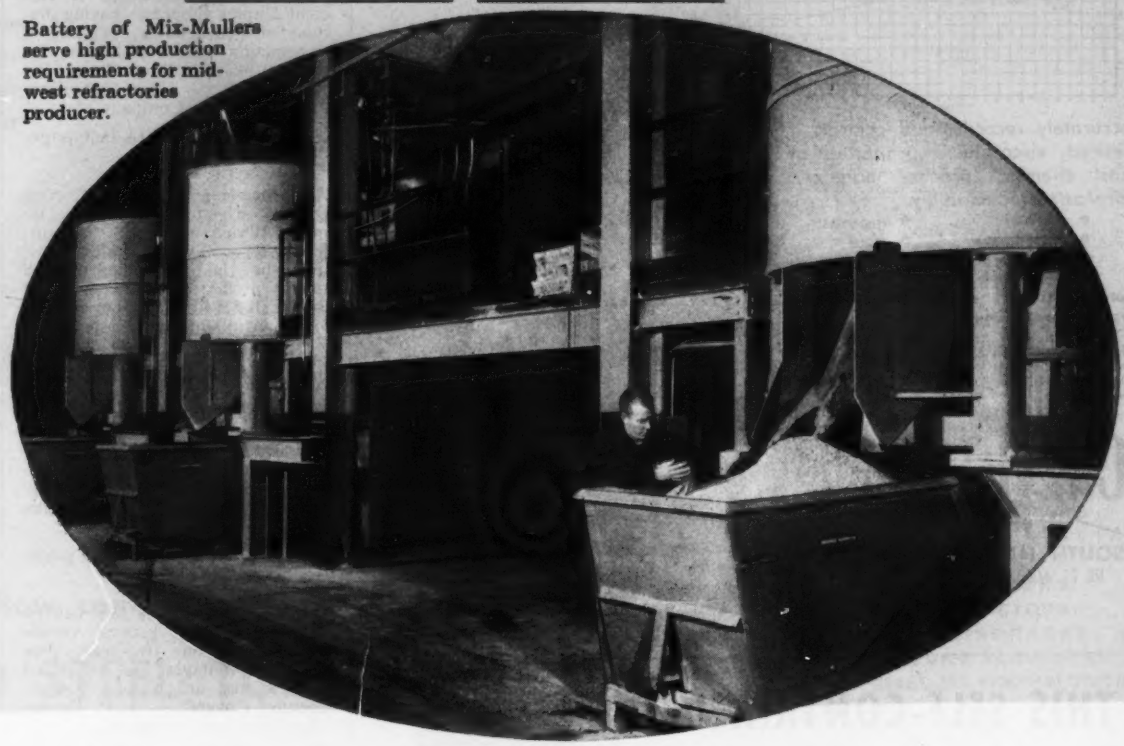
(Further information about Yerzley scrubbers are available from John Wood Company, Air Pollution Control Division, Essex Building, Bernardsville, N. J.)

Check 2178 opposite last page.

MIX-MULLER®

MEANS CONTROLLED DISPERSION FOR DRY SOLIDS:

Battery of Mix-Mullers serve high production requirements for mid-west refractories producer.



Intensive mulling can increase output at a savings in raw materials

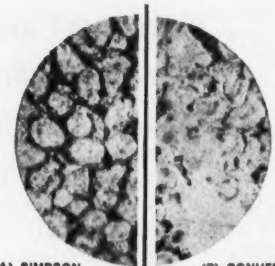
Increase in the usage of the Simpson Mix-Muller has paralleled an enlightened attitude on mixing practice among processors who have learned that careful and *controlled* mixing operations can be an important source of savings in the preparation of dry solids.

In the Simpson Mix-Muller, an intensive kneading, smearing, spatulate action—a mulling action—serves to actually *coat* one material with another. Dispersion of important and expensive components of the mix is rapid, thorough . . . and under your complete control.

If you're caught in the bind between expensive raw materials, increased production demands and boosted quality control standards . . . can you afford to settle for *less* than *controlled dispersion*? Write for details on a confidential **mulling** survey.

See our advertisement in CHEMICAL ENGINEERING CATALOG

Here's why:



(A) SIMPSON MIX-MULLER (B) CONVENTIONAL MIXER

Unmixed smears evident in (B) can cause waste of raw materials, "hot spots," rejects and reprocessing. These unmixed areas make quality control difficult and can nullify any mixer manufacturer's claim for fast mixing.

SIMPSON *MIX-MULLER*® DIVISION

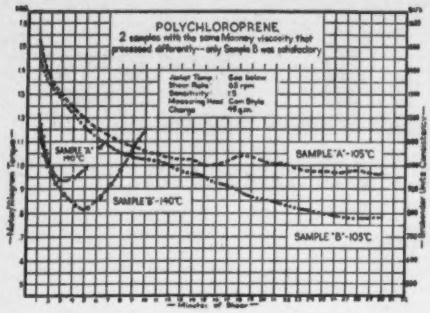
National Engineering Company

640 Machinery Hall Bldg. • Chicago, Illinois

WRITE FOR HANDBOOK

Handbook on Mulling describes controlled dispersion in simple terms, provides full details on nine models of the Simpson Mix-Muller; how it is used; how it can benefit you.

Check 2179 opposite last page.


POLYCHLOROPRENE
2 samples with the same Mooney viscosity that processed differently—only Sample B was satisfactory
SAMPLE 'A' 190°C
SAMPLE 'A'-105°C
SAMPLE 'B'-140°C
SAMPLE 'B'-105°C

PROCESSING PROBLEMS SOLVED . . .

before production begins with the stepless, variable shear rate PLASTOGRAPH by C. W. BRABENDER

Accurately records, and controls if desired, visco-plastic properties of most chemical process materials. *Forecasts processability.*

- plastics
- elastomers
- clays
- greases
- coke
- pastes

. . . to name a few

Batch testing accomplished *under typical processing conditions.* Up to 1150°F.

SEE FOR YOURSELF! Bring or send us your samples for free testing. Write for reprints of published applications in the field.

Various measuring heads for all types of material

C.W. Brabender
Instruments, Inc.
SOUTH HACKENSACK, N. J.
55 E. Wesley St., Diamond 3-8425

Check 2180 opposite last page.

THIS SELF-CONTAINED FLUID COOLING SYSTEM

. . . gives most accurate temperature control

Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

Heat is removed from your process *at the rate of input,* giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

Heat is rejected outdoors. Only the little water evaporated on the cooling coils in the air stream, or discharged to prevent hardness build-up, is consumed.

Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

NIAGARA BLOWER COMPANY
Dept. CP-5, 405 Lexington Ave., New York 17, N.Y.
District Engineers in Principal Cities of U. S. and Canada

Check 2181 opposite last page.

NEW LITERATURE

Processing Equipment

Angular mixers, roller mills, and colloid mills are outlined in four-page brochure. Featured is efficient Duplex Disperser having diamond-shaped agitator operating in conjunction with a 3600-rpm disperser head. "Troy Processing Equipment" — Troy Division, Skinner Engine Company.

Check 2182 opposite last page.

Air processing is topic of 12-page bulletin which includes data on ovens, dryers, air heaters and curing systems. Six case histories tell how the right equipment solved tough processing problems. Bul S-5 — J. O. Ross Engineering Division, Midland-Ross Corporation.

Check 2183 opposite last page.

Dust collector for product recovery and dust nuisance elimination is reviewed in four-page bulletin. Unit is designed to minimize material buildup and plugging. Bul 10-26-59 — Dustex Corp.

Check 2184 opposite last page.

Quick-opening covers that can be adapted to most process vessels are shown on two-page data sheet. Advantages and suggested applications are cited. "Quick-opening Covers" — J. P. Devine Manufacturing Company.

Check 2185 opposite last page.

Oil viscosity graph is featured in 15-page heat exchanger catalog. Six-step set of instructions tell how to select proper size shell-and-tube heat exchanger. Cat 1258A — Young Radiator Company.

Check 2186 opposite last page.

Automatic desludgers for use in chemical and food industries are pictured and described in eight-page, four-color booklet. Detailed sectional drawings depict operating cycles. Bul 2538 — Centrico.

Check 2187 opposite last page.

Porous stainless steel filters are reviewed in four-page brochure. Maximum allowable pressure drop for seven types of elements are listed. Bul M-212A — Micro Metallic, Division of Pall Corp.

Check 2188 opposite last page.

Water filters are subject of four-page bulletin. Two vacuum units are discussed, including flat-leaf and concentric-leaf designs. Capacities are 240 and 720 gpm. Bul 1860.20-2 — Proportioneers Division, B-I-F Industries, Inc.

Check 2189 opposite last page.

VALUE ENGINEERING PROVES

ROCKWELL *Resilient-Seated* Butterfly Valves *STAND OUT*

- Weigh Less—Cost Less
- Need Less Space
- Easier to Install
- Always Operable
- Low Pressure Drop
- No Fouling
- Negligible Maintenance
- Simplified Control —Manual or Remote

Bodies lined with any elastomer—from natural rubber to Viton.
Construction of any metal.
Operates from simple lever to automatic and remote control. No limit in size.
Let Bulletin 590X help you put value engineering to work on your valve applications. Just mail the coupon below.

W. S. ROCKWELL COMPANY
2200 Eliot St., Fairfield, Conn.

Send me Bulletin 590X.

Name .....
Title .....
Firm .....
Address .....
City ..... State .....

Check 2190 opposite last page.

HEAD LOSSES LOWERED due to smooth interior surface and to design of mating tube sections which prevent formation of pockets or obstructions on internal joint surfaces

INSTALLATION EFFICIENCY UPPED due to light weight, easy workability and ease of installation in limited space

A new fluid-flow competitor—

WELDED STEEL TUBE

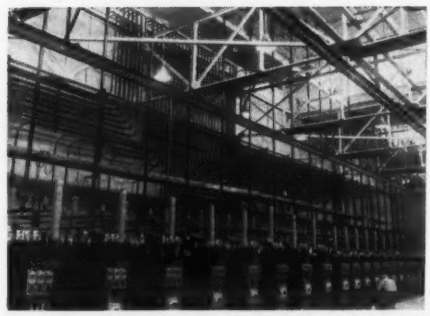
USES: With non-corrosive fluids.

Features: Use of tube can result in lowered pumping head losses because of smoothness of interior surface and of design of mating tube sections which prevents formation of pockets or obstructions on internal joint surfaces, Also, installation efficiency is reportedly high with tube which is lightweight, easily workable and can be installed in limited-space areas.

Description: Welded steel tube is unitized system because couplings are self-contained in tube itself. Tube is electric-resistance welded from flat-rolled steel. It is hydrostatically tested at 2000 psi. Mating ends of tube fit together with calculated clearance and can be brazed or soldered to form leakproof joints.

In test, tube reportedly showed less pumping head loss than did conventional pipe of same diam. The tube can be installed in limited spaces. Since couplings are part of tube, installer need only to have access to small portion of joint for applying heat to braze or solder. Therefore, tube lines can be placed close together.

In most installations tube is said to require fewer mechanical connections than



Installation of Tube

Welded steel tube is being used successfully in paint-mixing and circulating room of a large mid-western plant. Room services some 30 different color lines. Paints and solvents are mixed together in tanks in front (visible) row. Paint is circulated from tanks in a second row (not visible) by gear pumps to spray booths through thousands of feet of welded steel tube.

Whether paint is taken from line or not, continuous circulation is maintained from circulating tanks through lines and back to tanks. This prevents settling-out of paint constituents.

When circulating tank runs low, paint is pumped directly into circulating lines from mixing tanks, and is returned to circulating tanks. In this manner, circulating tanks are filled periodically and mixing tanks are emptied for new batches.

ENGINEERING PERSPECTIVE
THROUGH A

VENTURI

Venturi tubes were first used for measuring fluid flow. While this application has increased substantially, the use of the Venturi in important unit process operations has increased even more. A Jet-Venturi combination is literally the heart of many important manufacturing processes.

JET REFRIGERATION
JET COMPRESSORS
JET CONDENSERS
JET HEATERS
JET PUMPS
JET MIXERS
JET REACTORS
JET ABSORBERS
JET FUME SCRUBBERS
SPECIAL JET VENTURI UNITS

During the first several years of the forty-two year history of our firm, we specialized entirely on steam jet vacuum pumps (ejectors). Many thousands of these are in service throughout the country and in most foreign countries. Our tradename, EVACTOR, is an important word in engineering circles. While steam jet vacuum pumps are still our major item, other applications of Jet-Venturi equipment are increasing constantly. With the exception of closely related products such as barometric condensers, CHILL-VACTORS, and CONVACTOR* systems, all of our activity is directed to the one purpose of making Jet-Venturi units more efficient, more dependable, more economical, and to apply them to an increasing number of industrial applications.

* The CONVACTOR is a dual condensing system for economic and efficient recovery of high boiling components from water vapor.

CROLL REYNOLDS

Croll-Reynolds CO., INC.

Main Office: 751 Central Avenue, Westfield, N. J.
New York Office: 17 John Street, N. Y. 38, N. Y.

Chill-VACTORS® • Steam-Jet EVACTORS® • Aqua-VACTORS® • Fume Scrubbers • Special Jet Apparatus

Check 2191 opposite last page.

some of other types of pipe. Flow-direction changes are made with smooth bends rather than angle couplings. When space permits, large-radius bends can be used, thus lowering degree of pressure drop. Tube can be cut at any point for addition of tube or special fittings after completion of an installation.

Two types of threaded-outlet tees are provided with tube systems to link them with other equipment. One is fabricated from short length of tube with both ends expanded for coupling. Other is forged steel unit. Each type is brazed or soldered into line. Where line must be periodically opened for any reason, forged-steel unions can be soldered or brazed into line.

(Smoothweld welded steel tube is product of The Standard Tube Company, 24400 Plymouth Road, Detroit, Mich.)

Check 2193 opposite last page.

Long tangents lessen pipe-alignment problems

Uses: With light-wall pipe in applications such as concentrated-hydrogen-peroxide and ammonium-nitrate lines.

Features: Fittings have long tangents which permit easy alignment of pipe and fittings and fabrication of completely flanged elbows, returns, tees and crosses.

Description: Light-wall fittings are available in Type 6063T6 aluminum and other alloys, as well as in nickel, Monel, copper-nickel and most other weldable alloys. Fittings are available in ½ to 4″ pipe sizes, Schedule 10S.

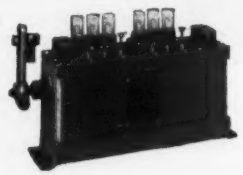
Light-wall pipe and fittings are readily joined by butt welding, fillet welding or brazing using aligning connector, Victaulic coupling, use of stub end and backup flange, and rolled-in flange assembly.

(Pipe-Mate aluminum and alloy fittings are product of Tube Turns Division, Chemetron Corporation, Box 987, Louisville, Ky.)

Check 2194 opposite last page.

HOW THIN can you slice a drop of oil?

Whether you want to deliver several drops or the minutest fraction of a drop per piston stroke, a Manzel lubricator will do the job exactly. Manzel lubricators force oil of any viscosity against the high steam, gas and air pressure so common in modern compressors, engines and machines. They start, stop, speed up or slow down in synchronization with your equipment. Write for our catalog explaining the whole line. Manzel, 251 Babcock Street, Buffalo 10, New York. For efficient lubrication



ask the man from

A UNIT OF HOUDAILLE INDUSTRIES, INC.

Manzel

SPECIALISTS IN LUBRICATORS AND METERING PUMPS SINCE 1898

Check 2192 opposite last page.

NOW

Portable Demineralizers on a Rental Basis

For use in compounding all formulae such as pharmaceuticals, lotions, solutions, etc., where high quality water yields better dispersion of ingredients and avoids incompatibilities. For general laboratory use, including high quality washing and rinsing. Here is water to meet the highest standards of chemical purity, quickly available in any quantity for regular daily use, short term runs or emergency needs.

- Available on a rental basis
- Maintained by Culligan experts — no work for you to do
- Up to 40 gallons per minute
- No elaborate installation
- Can be located at point of use
- Eliminates the bottle problem
- Dependable, uniform quality
- Meets government specifications
- For large or small uses

How Much Does It Cost?

In many cases less than a penny a gallon, depending on your raw water supply, volume, flow rate and quality needed.

Write today for Culligan's new "DI Water" Bulletin and the name of the Culligan dealer nearest you prepared to furnish this new special service.

Culligan

DI WATER DEPT. 7
NORTHBROOK, ILL.

Check 2195 opposite last page.

Chemical Boobytraps

Unsuspected hazards awaiting the unwary

Calcium hypochloride mixes poorly with pop

Carbonated beverages, usually asociated with refreshment, may also be chemical reactants. Recently, part of a bottle of such a beverage was accidentally spilled into a partly-filled drum of calcium hypochlorite, known also as bleaching powder or HTH. Chlorine gas was released with heat sufficient to generate pressure that exploded the drum.

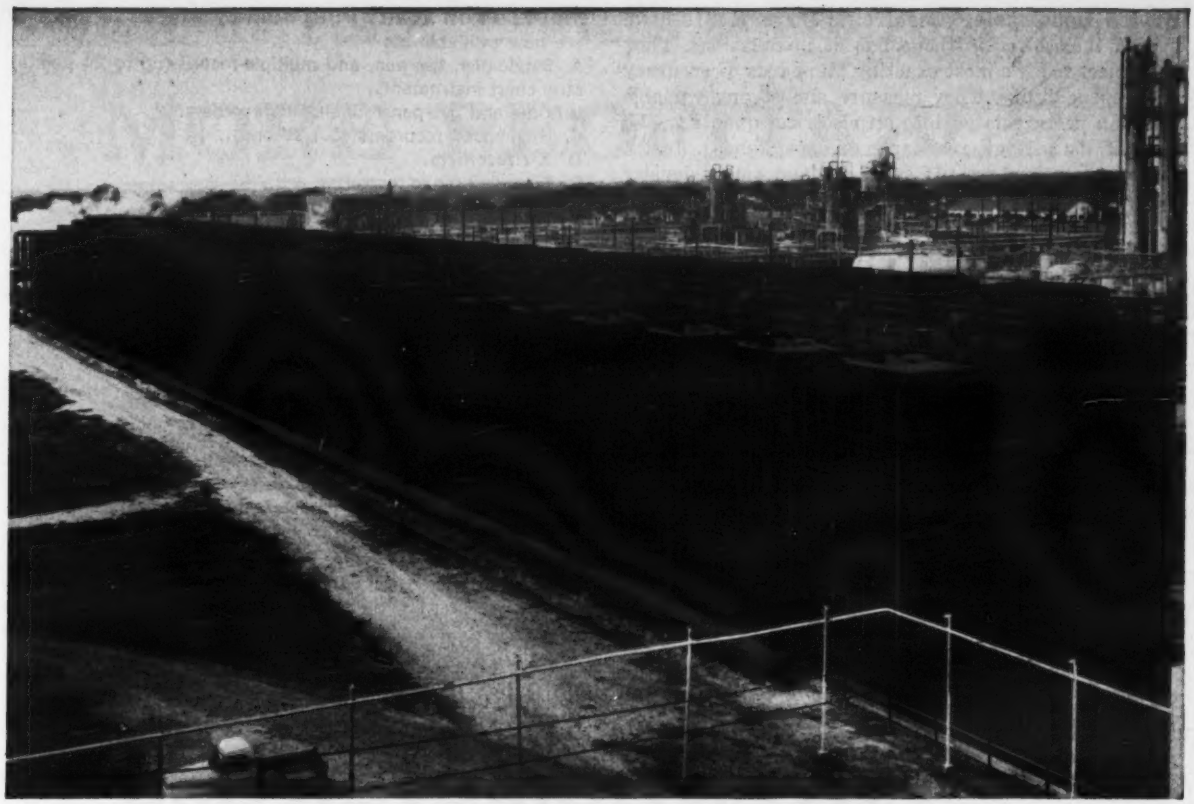
Since carbonated beverages contain both acid and sugar, the reaction with calcium hypochlorite is not really surprising. However, it is rarely that we think in terms of chemistry when enjoying such beverages.

Company in which this incident occurred has taken the following action to prevent similar accidents:

1) Limiting the quantity of hypochlorite by using only five-lb cans.
2) Keeping containers tightly closed at all times except when transferring.
3) Mixing only with fresh clean water, and keeping all other liquids, chemicals, drinks and foods out of the area.
4) Storing in a dry cool place.

(Contributed by Howard H. Fawcett, Safety Director, Research Laboratory, General Electric Company, Box 1088, Schenectady, N.Y.)

Health factors in safe handling of chemicals is topic of four-page pamphlet designed to help non-chemists in chemical plants to become familiar with toxicological terminology, to understand ways by which noxious substances enter body and exert harmful effects, and to know basic principles of first-aid treatment. Copies of Safety Guide SG-1 are available at $.15 per copy from the Manufacturing Chemists' Association Incorporated, 1825 Connecticut Ave., N. W., Washington 9, D. C.



65,000 GALLON PER MINUTE HUDSON COOLING TOWER SUPPLIED IN EMERGENCY

Faced with shutdown of process units because of a damaged, partially inoperative cooling tower, a large Gulf Coast oil refiner called upon HUDSON for emergency supply of new cooling capacity. Despite necessity for modification of HUDSON standard design to conform to existing foundation, and though working under adverse condition of stepwise removal and replacement of partially operating old tower, more than 30 percent of the new HUDSON tower was operating in less than five weeks. The promised time schedule was met, the crisis averted, and guaranteed cooling performance exceeded.

Performance of such special services with speed, ability and integrity is a measure of the quality of HUDSON service — whether in repairing or replacing an operating cooling tower, or in designing and supplying a complete integrated system with balanced use of water and direct air for cooling all process streams.

In addition to water cooling towers, HUDSON designs and manufactures SOLO-AIRE units (for cooling solely with air), and COMBIN-AIRE units (for cooling with combination of maximum air and minimum water). Avail yourself of HUDSON's years of experience in integration of these all-encompassing categories of equipment into cooling systems utilizing optimum ratio of air and water balanced to best meet specific conditions of climate, process, and water availability and quality.

ONLY HUDSON OFFERS — — — — process stream cooling systems integrating cooling towers, Solo-aires and Combin-aires for optimum balance of air and water cooling.

It will pay to consult Hudson during processing design stage of new projects.

HUDSON

ENGINEERING CORPORATION

FAIRVIEW STATION • HOUSTON, TEXAS

OFFICES: 16033 Ventura Blvd. Encino, California • 122 East 42nd St. New York 17, N. Y. • 199 Bay Street Toronto, Ontario, Canada • 17 Stratton St. Piccadilly London W. 1, England • Corrientes 1115 Buenos Aires, Argen • Rua Mexico 45 Rio de Janeiro, Brazil

Check 2196 opposite last page.

Bristol Dynamaster* Electronic Instruments have proved themselves in thousands of installations. They fully meet today's most exacting standards of accuracy and dependability. They measure almost any variable that can be translated into an electrical quantity (d-c current, d-c voltage, resistance or capacitance). Just a few are: temperature, pH, speed, voltage, smoke density and strain.

Here are some outstanding features that make them ideal for industrial plants, pilot plants, and for research, test, and laboratory use:

1. Continuous standardization—eliminates standardizing mechanism and dry cell—no interruption to control. **But retains precision standard cell for highest accuracy and stability.**

2. Simple design—few moving parts.

3. Easy to use and service—little or no maintenance required.

4. Rugged construction—unaffected by vibration.

MODELS FOR EVERY PURPOSE. Dynamaster Instruments are now available as:

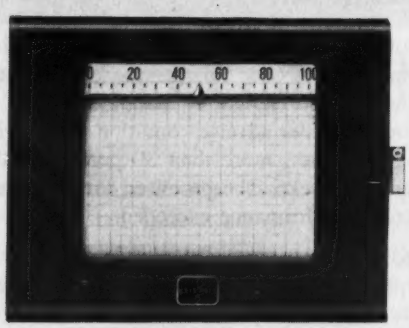
A. Single-pen, two-pen, and multiple-record (up to 24 points) strip-chart instruments.
B. One- and two-pen round-chart recorders.
C. High-speed recorders (0.4 second).
D. X-Y recorders.
E. Extended range recorders.
F. Adjustable span and zero recorders.
G. Miniature 3-inch strip-chart recorders.
H. Electric controllers in both strip- and round-chart models—all types of control action and as time-program control.
I. Pneumatic controllers in both strip- and round-chart models—all types of control action and time-program control.
J. Instruments for electronic measurement—pneumatic transmission of reading by 3-15 psi signal.
K. Round chart program controllers.
L. Telemetering transmitters.
M. Drum-type precision indicators.
N. Multi-bank recorder—will accept up to 200 separate inputs and record them on 12-inch wide strip chart.
O. Relay-rack mounting models—most models available in case that fits standard 19" relay-rack without modification to instrument or rack, without panel-cutting or masking.

Bristol Dynamaster Potentiometer and Bridge Instruments can be equipped with analog-to-digital encoders of various types for digital readout and computer use. For complete details, write for Bulletins P1245A, P1270, P1271, P1242, and P1282. The Bristol Company, 141 Bristol Road, Waterbury 20, Conn.

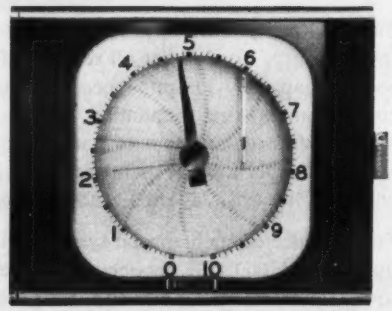
*T. M. Reg. U. S. Pat. Off.

look to Bristol for the complete line of

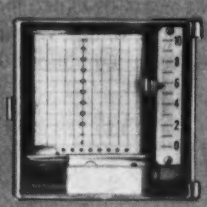
ELECTRONIC POTENTIOMETER and BRIDGE INSTRUMENTS



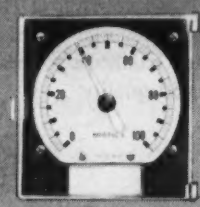
Dynamaster* Electronic Potentiometer or Bridge—records on 11-inch, 120-foot-long strip chart.



Dynamaster* Electronic Potentiometer or Bridge—records on 12-inch round chart, indicates on extra-large scale.



RECORDER



INDICATOR

Plug-in Miniature Electronic Dynamaster Potentiometer and Bridge instruments—Only 5" x 5⅛" panel dimensions; ideal for graphic panel instrumentation.

BRISTOL
TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Check 2197 opposite last page.

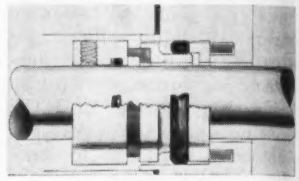
ENGINEERING & SAFETY

Balanced fluid pressure subs for springs in seal

Deep carbon faces designed for minimum wear

Uses: Pump-sealing applications.

Features: Seal is springless in operation. It achieves sealing by using balanced hydraulic pressure to replace



In seal, springs are used merely to hold faces in sealing contact when fluid pressure is below design minimum

operational springs. Fluid pressure alone closes sealing faces during operation. Unit incorporates deep carbon face which wears evenly.

Description: In seal, springs are used merely to hold faces in sealing contact when fluid pressure is below design minimum. As operating pressures are reached, hydraulic force counteracts springs. This results in symmetrical and uniform face closure.

(CounterPoise seal 500 is product of A. W. Chesterton Co., Six Ashland St., Everett 49, Mass.)

Check 2198 opposite last page.

"You advertised for a sanitary Engineer?"

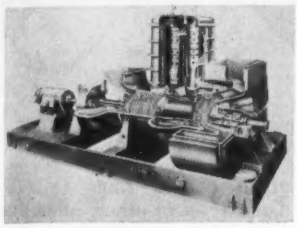
WILLIAM B. HAUSERMAN, PHILADELPHIA QUARTZ COMPANY OF CALIFORNIA

Liquid or gas fuel can be burned by turbine

Uses: Providing rotative power for centrifugal compressors, power generators and liquid pumps.

Features: Turbine burns either liquid or gaseous fuels. It is capable of continuous operation under full-load conditions at normal rated speed of 5000 rpm.

Description: Open-cycle single-shaft gas turbine has NEMA rating of 9000 bhp. At rated speed, actual compressor delivers mass flow of 135 lb/sec. Turbine inlet temperature is held under 1400°F. Turbine is completely air cooled.



Open-cycle single-shaft gas turbine has NEMA rating of 9000 bhp

Three-stage turbine supplies power to drive compressor and load. It incorporates volute and rotor of built-up forged-steel disc design. Gas-turbine control is achieved by regulation of flow-rate.

(Gas turbine 305-S is product of Clark Bros. Co., one of the Dresser Industries, Olean, New York)

Check 2199 opposite last page.

Centralized lubrication comes up for discussion in 24-page bulletin which covers principles of operation as well as system components. Bul 26-T — Farval Division, Eaton Manufacturing Company.

Check 2200 opposite last page.

Roller chain, chain couplings and sprockets are itemized in 56-page bulletin which includes formulas and sample calculations. Bul A691 — Dodge Manufacturing Corporation.

Check 2201 opposite last page.

Fruehauf Tank-Trailers Make Your Hauls

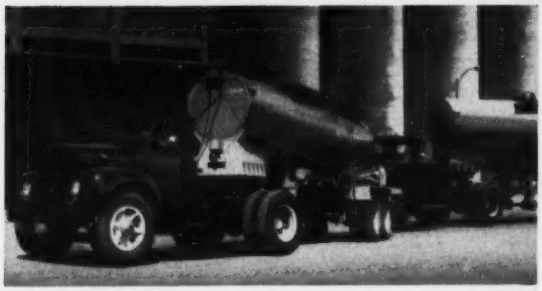
MORE PROFITABLE!

Fruehauf stainless steel Tank-Trailers are scientifically designed to haul resins and solvents, acids, flammable chemicals, petro-chemicals, petroleum and other liquids. Capacities range from 3,000 to 8,000 gallons. Lighter weight, corrosion-resistant stainless tanks will haul up to 700 gallons *more payload* than comparable-sized steel units.

Fruehauf Chemical Tanks Carry Bigger Loads At Less Cost

A full, working knowledge of the specialized needs of professional chemical haulers has enabled Fruehauf engineers to produce versatile, high-capacity units able to carry practically any powdered or liquid chemical on the market today.

It's no wonder professional haulers are finding that, dollar-for-dollar, Fruehauf Tank Transports are their best profit buy! Versatility . . . dependability . . . safety . . . higher profits . . . all these advantages are *designed into* a Fruehauf unit!



"Airslide"* pneumatic-pressure Tank-Trailers are designed for more economical bulk transportation, plus faster handling of powdered chemicals and other bulk commodities. Unloading rate of "Airslide" units depends on commodity, but 120 barrels of cement may be unloaded in 36 minutes!

*"Airslide"—Trademark, Fuller Company

For Forty-Six Years—World's Largest Builder Of Truck-Trailers!

FRUEHAUF TRAILERS

FRUEHAUF TRAILER COMPANY
10948 Harper Avenue • Detroit 32, Michigan

I'd like full information on Fruehauf Bulk Transports

☐ Aluminum ☐ Steel ☐ Stainless ☐ "Airslide"

Name_____
(Please Print)
Company_____
Address_____
City_____ State_____

Check 2202 opposite last page.

ALLIS-CHALMERS

This maintenance man's toolbox sums up the story of

the simplest process in processing:

maintaining the products of Allis-Chalmers

Even the standard products Allis-Chalmers builds for chemical processing are designed for the industry's special requirements . . . and designed so routine inspection and maintenance are simply, quickly done.

And from no other manufacturer can you match the range of equipment available and benefit from Allis-Chalmers unit responsibility. Listed at right are some of the Allis-Chalmers products built to serve you economically throughout the plant — from raw material to finished product.

For service that matches the quality of the equipment, call the A-C representative near you. Or write ***Allis-Chalmers,*** *Milwaukee 1, Wisconsin.*

A-C products for chemicals: Electrical Generation and Distribution Equipment; Pumps, Motors, Control, Valves, Dielectric Heaters, Rectifiers; Processing Machinery (mills, screens, kilns); Water Conditioning Systems, plus Material Handling Equipment. A-1268

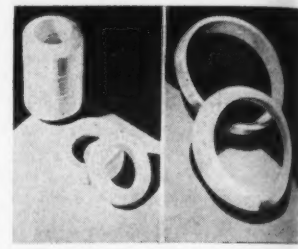
Check 2203 opposite last page.

Ring sets securely seal with low pressure

Uses: Static and semi-static packing applications where rotation is not a factor, as in valves and heat exchangers.

Features: Packing-ring sets make tight, secure seals under minimum gland pressure.

Description: Cup-and-cone- and wedge-style packing-ring sets are made of TFE Teflon. Nominal force applied to



Packing-ring sets are made of TFE Teflon

gland causes rings to slide against each other, thus exerting pressure both against stem or rod, and against bore of stuffing box.

(Cup and cone packing rings 300 and wedge packing rings 305 are product of Chemical & Power Products, Inc., 11 Broadway, New York 4, N.Y.)

Check 2204 opposite last page.

Pump need is nulled by centralized lubrication

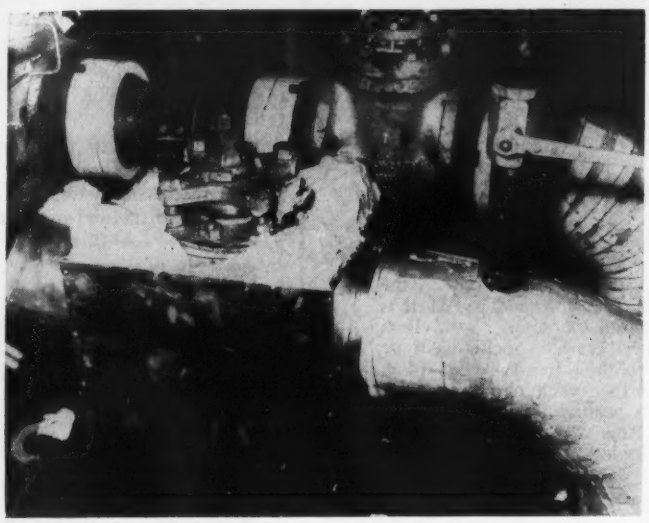
Uses: Centralized lubrication of small machinery or where space does not permit mounting manual or automatic pump.

Features: System can be used with hand- or power-operated grease gun. It precludes need for pump.

Description: Up to 16 lubrication outlets may be handled from single assembly. Output varies from 0.01 to 0.07 cu in of grease per cycle. Measuring systems operate in sequence. This permits each bearing to get full shot, and blocked line or bearing stops cycle.

(Type M lubrication system is product of Trabon Engineering Corporation, Solon, Ohio.)

Check 2205 opposite last page.



Liquid polyurethane insulation completely fills aluminum mold around valve. It is then trimmed and aluminum cover installed to complete metal finish

Pipe 'sweat' stopped cold by urethane insulation

PROBLEM: In converting to natural gas at its St. Petersburg plant, Florida Power Corporation wanted to prevent condensation on pipe and associated fittings. This "sweat" was to be prevented in range of 32°F to ambient (averaging approximately 70°F). A rigid and dimensionally stable insulation was preferred, since all insulated surfaces were to be covered with aluminum.

Solution: Approximately 1500′ of various-size-diam pipe was covered with foamed rigid polyurethane insulation. Roughly 65 valves were insulated by means of a liquid foam-in-place polyurethane insulation.

For straight sections of pipe, molded half-sections three-ft long were used. On fittings, half-sections were cut to fit. One-inch insulation was used throughout. Joints were pointed with sealer and aluminum jacketing then installed.

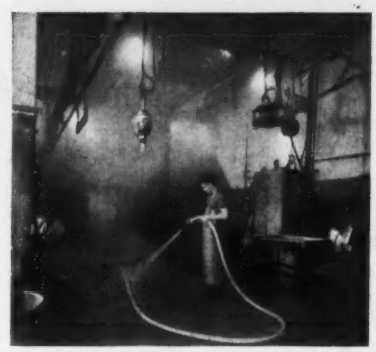
For each valve, aluminum box was first built-in around fitting. Liquid polyurethane was then poured in box and allowed to foam. After curing and trimming, aluminum cover was put on. Box thus served as both mold and finish covering.

Results: Insulation has succeeded in preventing condensation on natural-gas lines. Contractor that did installation quoted a price $1500 lower than one who planned to use different type on insulation. This saving was attributed to ease of application of insulation.

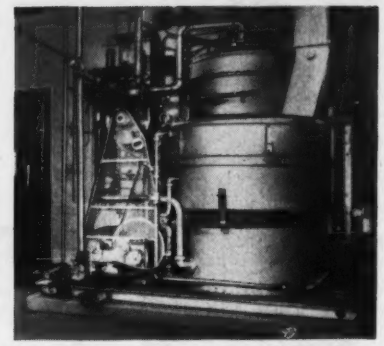
(Gem-Foam rigid polyurethane insulation and Gemfil foam-in-place polyurethane insulation are products of Baldwin-Ehret-Hill, Inc., Trenton, N. J.)

Check 2206 opposite last page.

3 BOILERS IN 1 COMPACT PACKAGE!



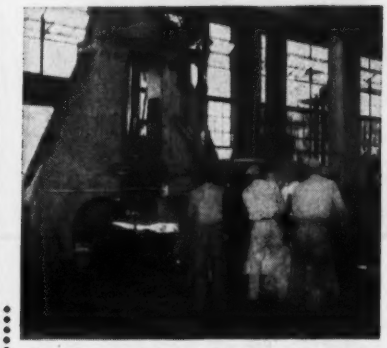
FOR ORDINARY STEAM REQUIREMENTS: The cycle-type Modulātic standard unit furnishes 90% dry steam for most ordinary needs such as cooking, heating water, drying, cleaning, etc.



WHERE DRY STEAM IS REQUIRED: The Modulātic may be used with an optional steam separator, for over 99% dry steam for heating, moulding, forges, operation of power equipment, etc.

VAPOR MODULĀTIC
WATER TUBE BOILERS

¼ the size and weight of conventional boilers... largest size (150 BHP) uses only 5′ x 8′ space.



IF CONSTANT STEAM LOAD MUST BE MAINTAINED: For applications where even a nominal drop in pressure cannot be allowed, an optional steam reservoir may be added to the standard unit to provide a "cushion" during an off cycle.

Efficient . . . economical . . . proved in thousands of installations all over the world! Vapor Modulatics furnish high or low-pressure steam (at design pressures up to 1000 psi, or even higher). Lowest installation costs—delivered completely assembled, wired and tested . . . all sizes (40 to 150 BHP) fit through plant doors, with no special foundations or special chimneys needed. Simple push-button operation; built-in safety controls. May be mounted in multiple units to provide for the largest steam requirements—without the inefficiency of idling larger single boilers as demand slackens.

send for free literature:

VAPOR HEATING CORPORATION, Dept. 3-E
80 E. Jackson Blvd., Chicago 4, Ill.

Please rush me your free bulletins on Modulātic Water Tube Boilers.

NAME_____
TITLE_____
FIRM_____
ADDRESS_____
CITY, ZONE, STATE_____

Our requirements are:

BHP REQUIRED_____
SAFETY VALVE SETTING_____
MINIMUM STEAM LOAD_____
MAX. STEAM LOAD_____
STEAM PRESSURE_____
TYPE OF FUEL_____

Check 2207 opposite last page.

THROTTLABLE PLASTIC GATE VALVES IN PENTON AND PVC

The interesting facts about this Flex-Plug Valve are: (1) It performs with the no-pressure-drop construction *of a gate valve*. (2) It performs also with the positive throttling control *of a globe valve*. (3) It is available in PVC and Styrene-Copolymer as well as Penton constructions with screwed, socket-weld or flanged ends. (4) Made with a free-to-swivel plug, it seats on a different surface each closure for far longer wear along with its positive control. (5) Suitable for vacuum service, this valve is rated for 150 lbs. service. Write for Catalog 42.0 today!

Vanton PUMP & EQUIPMENT CORP.

DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

Check 2208 opposite last page.

"BUT CAN A VIBRATING CONVEYOR MOVE MY STUBBORN MATERIALS, TOO?"
SURE, CLEVELAND VIBRATOR CONVEYORS MOVE MOST ANY GRANULAR MATERIALS!
TAKE FLUFFY POWDERS FOR EXAMPLE. TIERS PROVIDE MORE VIBRATORY SURFACE-SO THEY DON'T COMPACT!
AND CHUNKY MATERIALS ARE A CINCH!
CLOSED CONVEYORS PREVENT CONTAMINATION OR SPILLAGE!
-AND GENTLE VIBRATORY ACTION WON'T BREAK OR CHIP BRITTLE PARTICLES!
ACCURATE CONTROL-STARTS, STOPS AND REGULATES FLOW SAFELY AND SURELY. SO...
HOT OR COLD, DRY OR WET, CLEVELAND CONVEYORS MOVE BULK MATERIALS-EVEN SORT 'EM!
THERE IS A CLEVELAND CONVEYOR THAT WILL MOVE MY PROBLEM MATERIALS!
MOVE YOUR MATERIALS, TOO!
CLEVELAND

IF YOU HAVE Bin Stuck Lately? CALL CHerry 1-7157 FOR A FEEDER OR CONVEYOR for every installation ...every need

THE CLEVELAND VIBRATOR CO.

Dept. 5C, 2706 Clinton Ave., Cleveland 13, Ohio

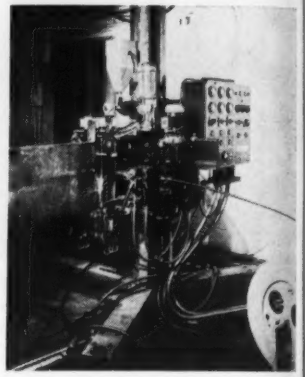
Check 2209 opposite last page.

Vertical-welding machine is first to use electroslag

Fully automatic welder handles material to 10"

Uses: Welding of pressure vessels, tanks and plate.

Features: Machine is reportedly first to successfully use vertical-welding technique based on electroslag-welding principle.



Fully automatic welding machine permits continuous one-pass arcless fusion welding of pressure vessels, tanks and plate to 10" thick

Description: Fully automatic welding machine permits continuous one-pass arcless fusion welding. It handles material to 10" thick.

Machine is adaptable to plate and forgings from 1½" to more than 10" thick that can be set up in vertical position. It can be fused for girth seam welding.

(Vertomatic welding machine is featured in 15-page bulletin which explains electroslag welding. Vertomatic Welding Bul — Arcos Corporation, 1500 S. 50th St., Philadelphia, Pennsylvania.)

Check 2210 opposite last page.

Complex shapes insulated against temp to 2200°F

Uses: Insulation of complex shapes including uniform rectangular pipe, uniform circular pipe, discs, bowls, and others.

Features: Insulation will handle temperatures to 2200°F

satisfactorily, it is reported.

Description: Fibrous potassium titanate formed-shape insulation is available in variety of styles. These include rectangular and curved pads and solids — both flat and arched. Average bulk density of material is 60 lb/cu ft.

(Resistotherm insulation is product of Resisto Chemical, Inc., PO Box 1945, Wilmington 99, Del.)

Check 2211 opposite last page.

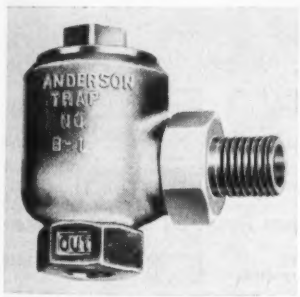
Union is integral part of steam trap

Uses: Steam-trap applications.

Features: Union is incorporated into steam trap. This permits disconnection of trap by loosing single fitting.

Description: Steam traps incorporate phosphorus bronze and monel bellows with constant spring load. This opens instantaneously when contacted by cold air or condensate.

Removable cap of forged steam bronze or cast semi-

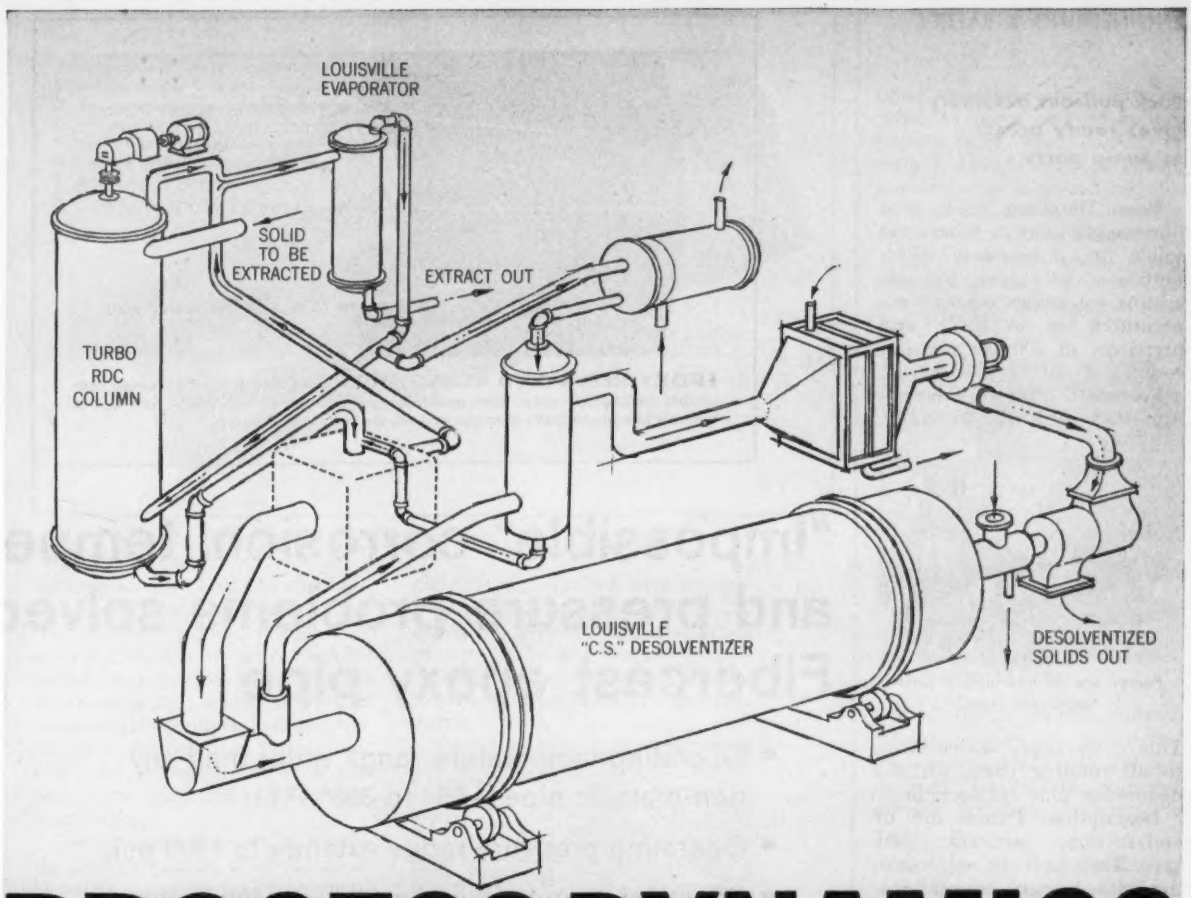


Built-in union in steam trap permits disconnection of unit by loosening single fitting

steel affords access to interior of trap. Valve and seat are made of Anderloy. Valve is both tapered and guided. Traps can discharge to 3100 lb/hr of condensate. They are suitable for pressures to 250 psi.

(Quik-Flex thermostatic traps are detailed in Specification Sheet 2384 — The V. D. Anderson Company, division of International Basic Economy Corporation, 1935 W. 96th St., Cleveland, Ohio.)

Check 2212 opposite last page.



PROCESS·DYNAMICS

A new concept for evaluation and control of **Equipment** and **Process Performance**

General American's wide diversification permits the design of equipment for *controlled performance* and *process in transport*. This diversification plus specialized experience and extensive laboratory facilities assures you of correct equipment construction and maximum utilization of automated systems.

Our engineers, with their broad experience in equipment and process specialties, are ready to work with yours to provide any of the listed equipment and systems, and to install them anywhere in the world.

Unified responsibility as provided by General American means greater efficiency, fewer complaints, improved coordination and far less down-time than you can possibly get when your equipment is furnished by a variety of suppliers.

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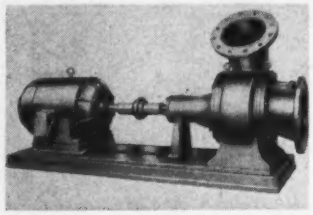
Check 2213 opposite last page.

Back pull-out assembly gives ready access to pump parts

Uses: Handling fluids with fibrous, granular or other type solids in suspension, thick liquids of all types, for operating conditions where temperatures up to 350°F and pressures to 400 psi are encountered.

Features: Pumps incorporate back pull-out assembly.



Pumps are of end-suction vertically split type

This gives ready accessibility to all rotating parts without disturbing pipe connections.

Description: Pumps are of end-suction, vertically split type. They have 45° self-venting discharge connections. Top horizontal or vertical up discharge can be furnished on order. Seven types of materials of construction are available including stainless steel. Capacity range is 9500 gpm for heads to 220′.

(Heavy-duty process pumps are described in 12-page bulletin which includes performance data and dimensions. Bul 725.5 — Goulds Pumps, Inc., 200 Black Brook Rd., Seneca Falls, N.Y.)

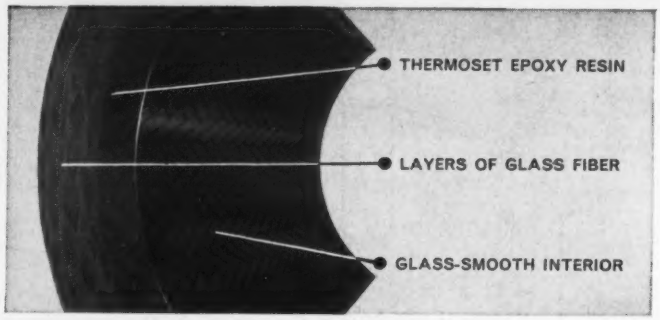
Check 2214 opposite last page.

Linearity is provided for infinite-speed control

Uses: Feeding, metering and automatic speed control systems.

Features: Control provides equal changes in speed for equal control adjustments.

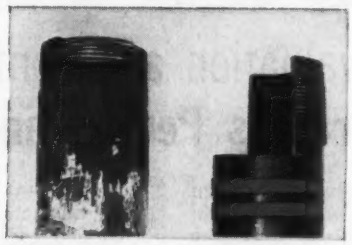
Description: Variable-speed transmission has roller carrier fixed to motor shaft. This supports three tapered rollers which are engaged by encir-



EPOXY RESIN AND GLASS FIBERS combined in a high-speed centrifugal casting operation. High quality components processed under rigid quality controls bring to industry a unique and efficient non-metallic pipe.

"Impossible" corrosion, temperature and pressure problems solved by Fibercast® epoxy pipe

- Operating temperature range wider than any non-metallic pipe (–65° to 300° F.)
- Operating pressure range extends to 1000 psi.
- Effectively combats corrosion, contamination, abrasion, scaling, electrolytic action.



Fibercast Tubing (right) used to suspend a 1,200 lb. pump for 3 years in a salt water supply well. *There was no loss in strength.* The damaged plastic-coated steel nipple (left) was used in the same installation, failed after 3 months' service.

WHAT is Fibercast?

It is a centrifugally cast, thermoset, epoxy resin reinforced pipe that handles temperature and pressure problems where no other non-metallic pipe will do.

Its body of woven glass fibers provides resistance to high tension forces. These fibers, combined by adhesion, are imbedded and bonded by heat in epoxy resin. The result is a strong, long-lasting pipe with remarkable ability to withstand high pressure and temperature in corrosive environments.

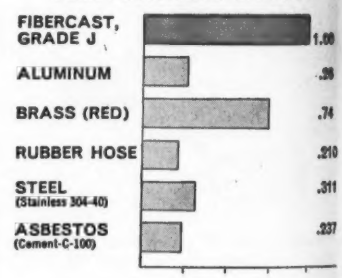
WHY use Fibercast?

For a multitude of reasons. Because its advantages range from superior resistance to heat, pressure and corrosion, to its ease of handling, light weight, dielectric properties and structural stability. Because Fibercast's long service life alone would justify choosing it over other materials. Because even more expensive metal pipe or pipe with thermo-plastic interior coatings cannot match Fibercast's proven durability. Case histories and accurate testing have proved over and over that Fibercast performs better, lasts longer, costs less. Out of 338 common corrosive solutions, Fibercast competently handles 320. And naturally, Fibercast's unique and lasting qualities under such conditions mean that it drastically reduces maintenance and replacement costs, too.

Although Fibercast's light weight makes it correspondingly easy to work with (it is less than 25% the weight of steel), it has the same basic linear coefficient of expansion as steel (7.06 x 10^{-6} to 8.25 x 10^{-6} in./in./°F.). Fibercast's strength permits installation on pipe racks with span lengths generally used for metal pipe.

The pipe has a smooth interior, with a Hazen-Williams C Flow Factor of 147. This cuts friction losses, aids flow and tends to resist build-up. It is a non-conductor (accepted by the electrical industry as a superior insulator), and is not subject to cold flow. A low coefficient of heat transfer (3.0 x 10-3 Cal/CM² /sec /CM°C.),

COMPARATIVE LIFE DATA*



*Basing Fibercast as unit life of 1 and others as comparative percentages thereof.

minimizes heat loss and may even eliminate heat tracing.

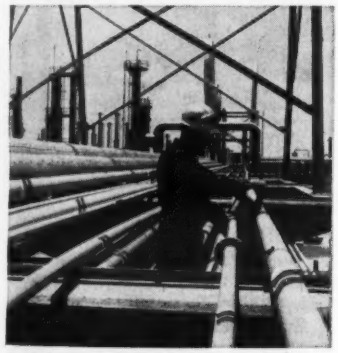
All three major systems of joining all pipe are used with equal success on Fibercast. They are: standard flanged, cemented, and threaded and coupled with a complete selection of Fibercast fittings (the world's largest line of corrosion-resistant epoxy pipe fittings).

Safety, too, is an important reason for using Fibercast Pipe in transporting dangerous chemicals, particularly in areas where the pipe is adjacent to personnel. Most piping materials corrode undetectably from inside-to-out and can suddenly burst without warning, inflicting injury to personnel. Because of Fibercast's woven glass fiber construction, such occurrences, if they ever occur, *are* detectable in minute, repairable leaks.

WHO uses Fibercast?

The petroleum industry . . . chemical . . . petro-chemical . . . nuclear energy . . . textile . . . paper . . . and food-processing industries . . . countless operations handling acids, alkalies, salt water and other corrosive liquids under pressure can all use Fibercast profitably.

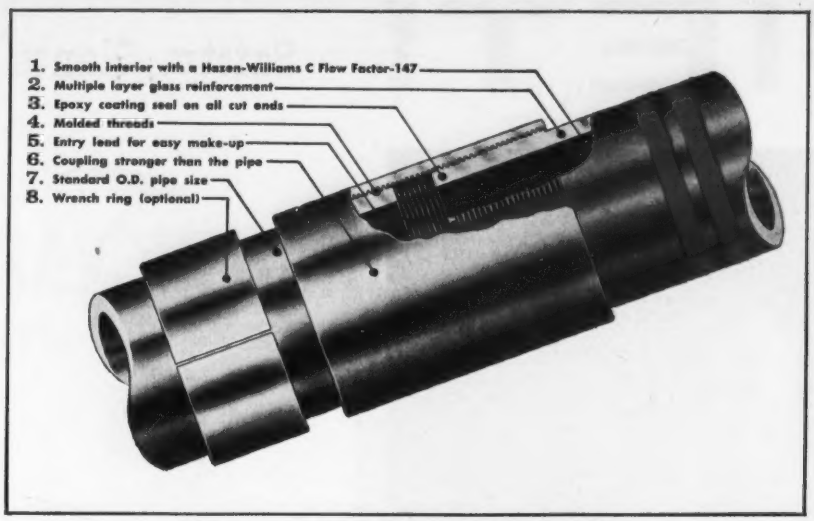
In oil country, Fibercast is already



Workman is painting a section of Fibercast Pipe bearing 32% HCl at Shell's Texas Chemical plant. Note that Fibercast has sufficient strength for installation on span racks with the spacing normally used for metal pipes.

widely acclaimed for superior performance in rugged, abusive and even high pressure installations like salt water disposal wells and horizontal lines. In cases where other pipe and tubing required replacement after just a few weeks of service, Fibercast is still performing efficiently after many years.

In petro-chemical and chemical-processing plants, Fibercast is valued


1. Smooth interior with a Hazen-Williams C Flow Factor-147
2. Multiple layer glass reinforcement
3. Epoxy coating seal on all cut ends
4. Molded threads
5. Entry lead for easy make-up
6. Coupling stronger than the pipe
7. Standard O.D. pipe size
8. Wrench ring (optional)

8 Points of Fibercast Superiority

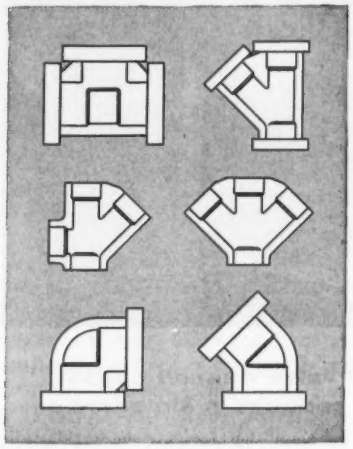
not only for high heat and corrosion resistance, but also for its remarkable maintenance of the purity of the solutions it is required to carry. Such installations range from Fibercast pipes which carry 37% hydrochloric acid at ambient temperatures to lines carrying solutions containing brine, alum, and other sulphates, sulphuric and phosphoric acids, and other damaging chemicals.

Food-processing industries, among the most demanding of all industries in purity, corrosion and heat standards of operation, know the long-term benefits of using Fibercast. Fibercast is especially effective in the processing of foods requiring use of sulphuric and phosphoric acids (such as corn syrup, starches, gelatins), as well as brines and other highly corrosive acids and solutions.

The operating conditions peculiar to the man-made textile and paper processing plants are also improved by the use of Fibercast Pipe and Fittings. The ever-growing demands of all industry . . . the rigid quality controls imposed by governmental and other agencies . . . the unique and often unsolved needs of new processes and methods . . . all of these factors help to create "impossible" problems that can be solved by the use of Fibercast.

Complete Line of Fittings

Fibercast provides fittings to solve any fitting problem. Besides a vast stock of standard sizes and types, Fibercast also designs and makes special fittings to meet individual requirements. All, of course, have the same corrosion, pressure and heat resistance properties of Fibercast Pipe and Tubing. A few of the regularly stocked types are shown in the line drawings below.



If *you* have an "impossible" corrosion, temperature, or pressure problem, consider the advantages of using Fibercast. To receive a free sample of Fibercast, and to get specific information about how Fibercast can help *you*, mail the coupon below.

FIBERCAST COMPANY
BOX 727, Sand Springs, Oklahoma

Please send me further information about Fibercast Tube and Pipe. CP-5A

Name_____

Title_____

Firm_____

Type of Business_____

Address_____

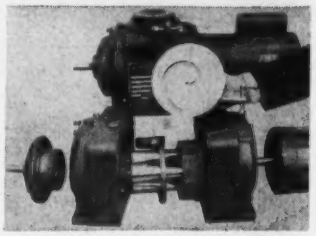
City_____ State_____

FIBERCAST® COMPANY — A DIVISION OF Youngstown SHEET AND TUBE COMPANY

Check 2215 opposite last page.

cling traction ring. Pinions fixed to large end of rollers engage ring gear joined to output shaft. To change speed, traction ring is moved lengthwise of transmission, engaging rollers at varying diameters.

Cam produces equal speed changes for each increment of movement of micrometer con-



Cam control is shown above major sub-assemblies of transmission with assembled transmission in background

trol handle to provide control linearity. Once set, transmission holds speed with change in load. Regulation is comparable to that of induction motor.

(Variable-speed transmission with linear speed control is product of Graham Transmissions Inc., Menomonee Falls, Wisconsin.)

Check 2216 opposite last page.

Shut-off to 12,000 psi with 30-lb handle torque

Uses: Shut-off applications to 12,000 psi.

Features: Only 30 lb handle torque is required to shut valve off bubble-tight against 12,000 psi.

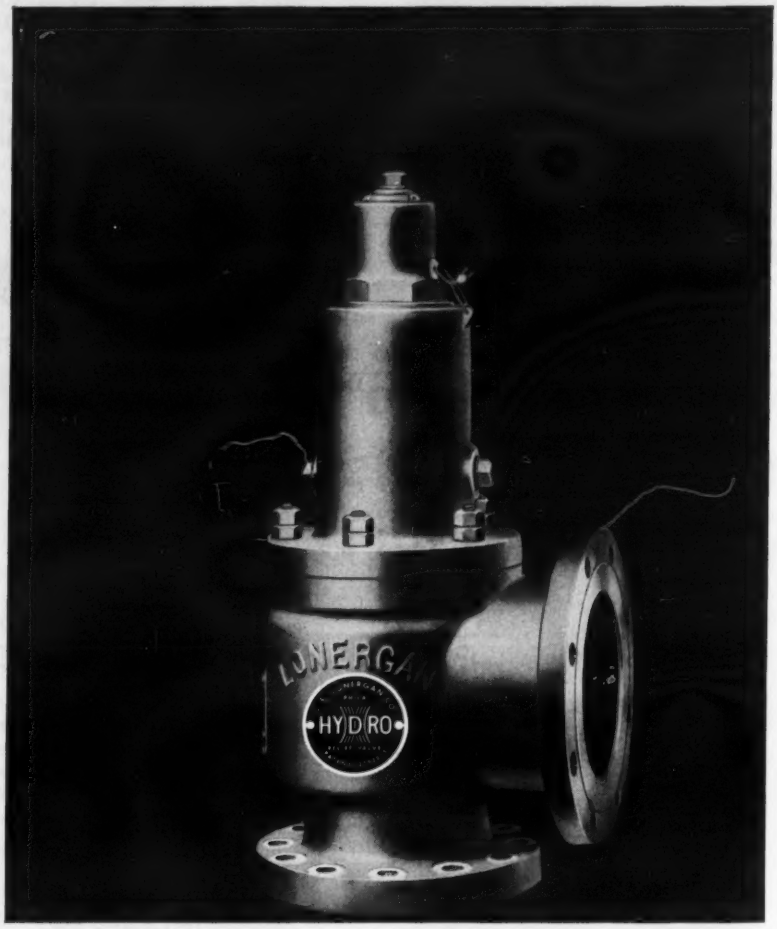
Description: Valve has all functional parts of stainless steel in stainless-steel forged body. All seals are self-energizing, automatically compensating for wear.

Standard valve is for temperature range of −65 to +250°F, with ½" diam flow passage and ¾" tube ports. Special valves can be supplied for temperature range of −100 to +500°F.

(Series 400 valves are product of Robbins Aviation, Inc., 2350 E. 38th St., Los Angeles, California.)

Check 2217 opposite last page.

QUIET!



New Lonergan liquid relief valve doesn't chatter; eliminates product waste; reduces maintenance

Ever hear a relief valve chatter? They all do! They shout their faults to the world, while beating themselves to death. When you can hear one, you know product is being wasted; maintenance costs are increasing; employees are growing annoyed; and perhaps dangerous, flammable liquids are running loose.

Now you can install a Lonergan Hydro-Valve guaranteed not to chatter, hammer, or drum, *yet still deliver full rated capacity !* Gone is the need to install an oversized valve or a high-priced, heavyweight regulator valve to eliminate chatter on by-pass and emergency relief applications.

The Lonergan Hydro-Valve does not contain any capacity-reducing gimmicks or gadgets to eliminate chatter. Instead, it is designed to be completely quiet under all operating conditions. It proves itself so on hundreds of applications every day.

Bellows models of the Lonergan Hydro-Valve are also available for corrosive applications. The elimination of chatter and its associated bellows flexing action, greatly extends bellows life and virtually ends the need for expensive bellows replacement. *Full details are in a Hydro-Valve bulletin. Write for a copy today !*

Lonergan

J. E. LONERGAN COMPANY, 203 RACE STREET
PHILADELPHIA 6, PENNA. • SINCE 1872

Check 2218 opposite last page.

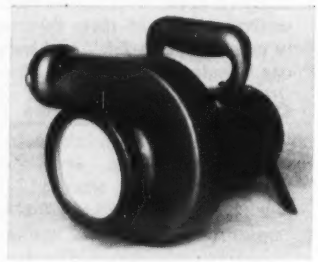
Safety Slants

One-handed quenching

. . . is possible with this dry-chemical extinguisher for protection of Glass B (flammable liquids) and Class C (electrical) risks. Unit is operated by simply squeezing handle together. It has effective discharge time of 10 sec. Extinguisher may be recharged by refilling with prepackaged dry material and charging with air or nitrogen to 150 psi. Net weight is 4¾ lb; it is 14½" tall and is supplied with mounting wall bracket.

(PDG 2½B Fire Extinguisher is product of American La-France, Elmira, N.Y.)

Check 2219 opposite last page.



Sampling at 100 cfpm

. . . of large quantities of air, in order to collect toxic materials for laboratory analysis, is possible with this air sampler. Sampler collects dust and aerosols in special filters. These can be analyzed to determine concentration of radioactive materials, toxic metals, dusts, contaminants and air pollutants.

Air sampler is powered by motor-driven turbine. Universal 0.5-hp motor with sealed ball bearings drives turbine. Unit is normally furnished for 110v, 50-60 cy. It is available for DC operation and 220v. Sampler weighs 9 lb complete with 4" sampling head.

(Sampler is product of Gelman Instrument Company, Chelsea, Mich.)

Check 2220 opposite last page.

Spray-on safety

. . . is possible with fluorescent safety paint. Two kits are available to permit trying out fluorescent safety paints. One, (S-3) is designed to hold three 16 oz aerosol cans containing white primer color and sealer. Another, (S-20) offers these three items in addition to ¼ pints of all 8 colors in Alkyd Enamel, white primer and protective sealer. Technical application bulletin is included with both sets.

(S-3 and S-20 Hi-Viz safety paint test kits are products of Lawter Chemicals, Inc., 3550 Touhy Ave., Chicago 45, Ill.)

Check 2221 opposite last page.

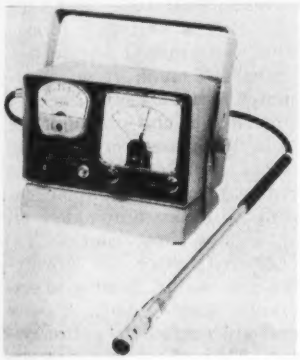
Dripless hand pump

. . . is fabricated entirely from low-pressure high-density polyethylene. Unit can pump most slurries and liquids from carboys, drums and tanks. Small drip well at top of pump

bell prevents liquid adhering to shaft from running down side and contacting operator's hand. Spout is turned up after dispensing to eliminate dripping hazard and can also be removed for shipping or storage.

(Nalgene Type H Hand Pump is product of The Nalge Co., Inc., PO Box 365, Rochester 2, New York.)

Check 2222 opposite last page.



Gas detection anywhere

. . . is possible with portable probe-type gas detector. Unit can also be operated as fixed indicator-alarm with up to 100′ of cable to detector element.

Meter is calibrated in percent of lower explosion limit of desired gas. Adjustable meter trip provides circuit for built-in buzzer alarm. Detector-tip position gives specific gas concentration at that point. Unit is 5 x 7 x 8″ and weighs 12 lb.

(Gas detector 521 is product of Houston Instrument Corporation, Box 22234, Houston 27, Tex.)

Check 2223 opposite last page.

Sulfur-dioxide storage, transfer and handling are discussed in 16-page bulletin covering cylinders and drums, leaking containers, pipe suggestions, transfer by heat and compressor, and measuring by volume and weight. Sulfur-dioxide Handling Bul — Chemical Products Dept., Ansul Chemical Co.

Check 2224 opposite last page.

depend on

Chempump

to give you

SAFER HANDLING OF TOXIC FLUIDS

Chempump—the first canned pump—completely eliminates dangerous leakage of chlorine, mercaptans, amines, nitric acid and all other toxic fluids. Chempump is absolutely leakproof, because it's totally enclosed. There are no seals, no stuffing box, no "O" rings—no chance for hazardous vapors, contamination or waste.

External lubrication is never required, as bearings are lubricated by the pumped fluid itself. Bearings are easily changed without breaking pipeline connections. Special designs and materials available for handling fluids with pressures to 5000 psi . . . temperatures to 1000°F . . . capacities to 600 GPM. Water or steam jackets available to insure proper operation in many special applications. Most models UL approved.

These and other Chempump advantages could well be the answer to safe, efficient and economical handling of your "difficult" fluids. *Write now for composite bulletin 1100,* Chempump Division Fostoria Corporation, Buck and County Line Roads, Huntingdon Valley, Pennsylvania.

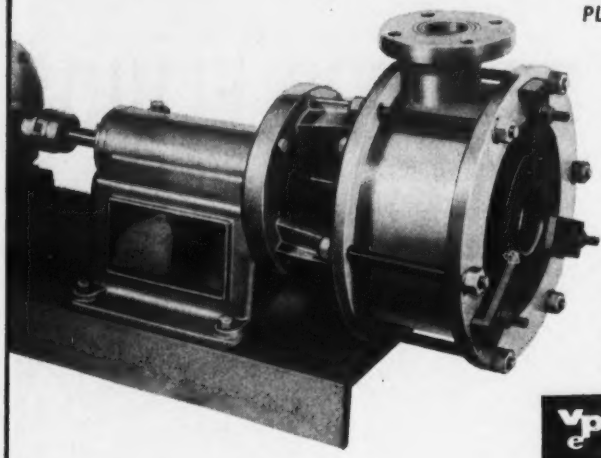
CHEMPUMP

first in the field . . . process proved

Check 2225 opposite last page.

VANTON CENTRIFUGAL PUMPS IN PVC AND POLYPROPYLENE

TO HANDLE HCl, H_2SO_4, MOST ACIDS, PLATING SOLUTIONS AND MANY SOLVENTS



Because the wetted parts of these pumps are constructed of unplasticized, unmodified polyvinyl chloride or Polypropylene these pumps offer the broadest possible range of corrosive resistance as well as the non-contaminating transfer of sensitive solutions.

Vanton Centrifugal pumps which are available in a broad range of sizes have capacities of 10 through 180 GPM; discharge heads to 160 feet and are lower in cost than many special alloy pumps for similar applications.

These pumps are ruggedly constructed, are engineered for efficiency and have mechanical shaft seals of the latest design in a range of materials to cover all corrosive applications and deliver top, low-maintenance performance in all applications. *WRITE FOR SPECIFICATIONS INFORMATION.*

Vanton PUMP & EQUIPMENT CORP.

DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

Check 2226 opposite last page.

CUT VIBRATOR MAINTENANCE

up to 80%

with Navco's "One-Piece"* Trouble-Free Construction

- No Body Ass'y Bolts to Shear or Stretch
- No Housing Springs to Replace
- No Separate Striking Plate to Leak Air
- No Grooved Pistons to Collect Scale or Oil Emulsions

Navco "Long-Stroke" vibrators dislodge arched materials with a timed impact—don't pack them as do high frequency vibrators. Complete line of Navco "one-piece" air vibrators for bins, hoppers, chutes, R.R. cars, concrete forms, and batching.

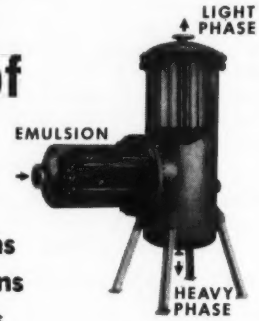
FREE CATALOG—*Detailed information on models and applications.* Write Dept. CP5

*Patented

NAVCO NATIONAL AIR VIBRATOR CO.
435 Literary Ave., Cleveland 13, Ohio

Check 2227 opposite last page.

CONTINUOUS SEPARATION of EMULSIONS



- steam distillations
- solvent extractions
- organic reactions

LIQUID SEPARATOR

Selas Liquid Separators offer a simple, efficient, rapid method of separating stubborn, unstable emulsions of immiscible liquids on a continuous basis. In addition, they are well-suited for the recovery of costly organic materials and for the dewatering of solvents and organic liquids.

High flow rates, coupled with low pressure drop, enable considerable reduction in energy requirements and equipment space. Simple, compact design provides for in-line installation on production systems. Selas Liquid Separators contain no moving parts . . require minimum maintenance.

Send for informative literature describing in more detail the Selas method of liquid-liquid separation. Write to Mr. G. Jordan, Mgr., Micro-Processing Div., Selas Corporation of America, 104 Dreshertown Road, Dresher, Pa.

SELAS CORPORATION OF AMERICA
DRESHER · PENNSYLVANIA
HEAT AND FLUID-PROCESSING ENGINEERS development · design · construction

Check 2228 opposite last page.

Recirculating-water units saved from scrap pile

Uses: Feeding balanced chemical treatment into circulating water systems of cooling towers and evaporative condensers.

Features: Use of unit eliminates weighing and mixing of chemicals, handling of acids and noxious odors.

Description: Feeding unit is closed reservoir mounted on side of equipment. Through it portion of recirculating water flows. On upper portion of unit, sleeve holds weather-sealed plastic tube containing sequence of variously formulated chemical briquettes. These are made of polyphosphates and organic chelates for removal and prevention of scale formation; organic corrosion inhibitors for rust removal and prevention; together with automatic pH algae and slime controls.

As briquettes are gravity-fed into water, flowing to reservoir they slowly dissolve and are carried to entire system. Flow of recirculating water controls the system automatically. Chemicals are fed only when pump is in operation at predetermined rate required for positive control.

(Chemicator and chemical briquettes are product of Erlen Products Company, Burbank, California.)

Check 2229 opposite last page.

WANTED:

To Keep You Alive

Almost everyone knows of some tricky unexpected danger situation in his plant. CHEMICAL PROCESSING feels that the dissemination of such information to readers is important. Therefore a monthly series on Chemical Boobytraps is now appearing in this section. (See page 171.) If you know of any such situation, please forward an account of it to:

Safety Editor
CHEMICAL PROCESSING
111 E. Delaware Place
Chicago 11, Illinois

THAT'S INTERESTING

Computer data filmed

Recording system, now in developmental stage, "reads" magnetic tapes from computers, translates data into letters and numbers, and instantly records them on microfilm. It can record 16,500 characters per second. Called DACOM, it is being developed by Eastman Kodak's Apparatus and Optical Division.

Sweetening crude oil

Sweet crude may become "sweeter" and sour crude less sour if a Texan's idea is adopted, according to *Our Sun* publication of Sun Oil Company. This Texan has discovered that jawbreaker candy balls dislodge paraffin that clogs certain crude lines. Candy lasts longer than naphthalene balls and is cheaper.

For more information on product at right, specify 2230 see information request blank opposite last page.

Where quality construction counts . . .

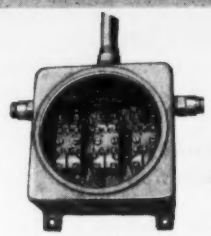
depend on

APPLETON®

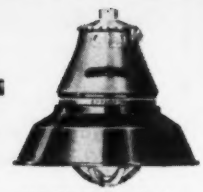
Explosion Proof Electrical Equipment

Wherever up to date protection is needed in "hazardous" areas, you can count on APPLETON to safeguard any installation from a rocket launching pad to a grain elevator. APPLETON engineering, manufacturing skills and quality controls assure you the very finest in electrical fittings . . . all supplied from one source. Whether it's a coal mine or hospital, oil refinery or dairy, depend on APPLETON for the best in electrical fittings, lighting, panelboard or other equipment.

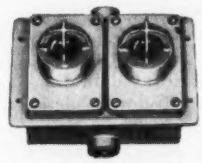
Sold Through Franchised Distributors Only



Type "GUB" Unilets—where junctions are required

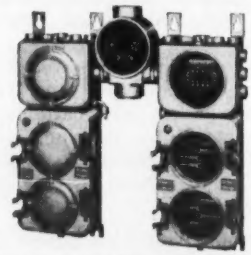


"AA-51" Lighting Fixtures—incandescent or mercury vapor lamp type . . . more light, at less cost



"EFD" Series—dust-tight pilot light and switch Unilets

"SFN" Sealing Unilets—for sealing off conduit systems at required points



Type "ELP" Dust-Tight Panel Boards—With Covers Removed. Has a range from 2 to 16 circuits . . . 15 to 30 ampere ratings

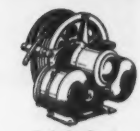
APPLETON ELECTRIC COMPANY
1701 Wellington Avenue Chicago 13, Illinois

Also Manufacturers of:

Industrial Lighting Equipment

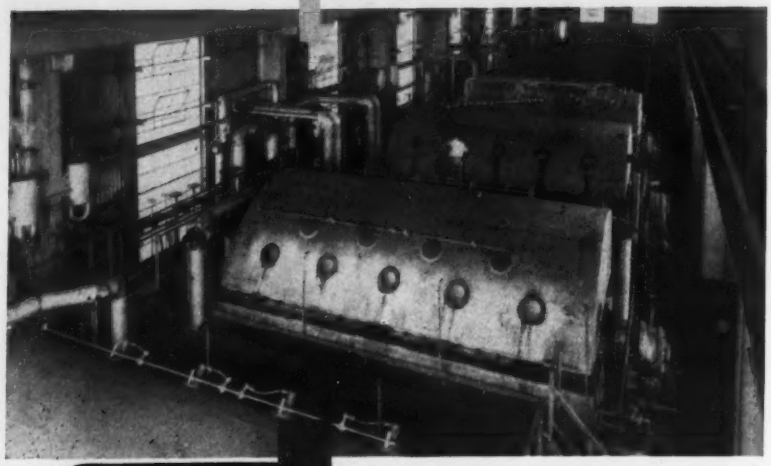
"ST" Series Connectors

Explosion-Proof Junction Unilets



Explosion-Proof Reolites

the problem: low oil content quality wax on a HIGH PRODUCTION BASIS



ROTARY DRUM FILTERS HANDLE THE JOB... EFFICIENTLY!

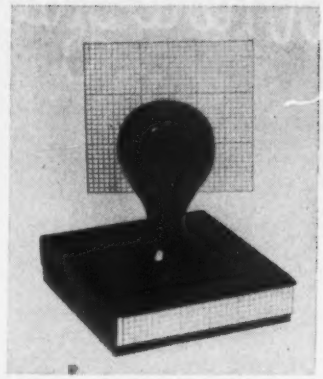
High efficiency is obtained with this G-B filter system for Mobil Oil Company at its Beaumont, Texas Refinery. These units feature a self-contained variable speed drive, efficient modern lighting and sight glasses, 2″ and 3″ FOAMGLAS insulation for low temperature operation. Fine quality parrafin wax of low oil content is obtained on a high production basis.

G-B filters are customed designed to meet your specific need. Write for more detailed information.

See our insert in Refinery Catalog and CEC.

GOSLIN-BIRMINGHAM
MANUFACTURING CO., INC.
P. O. BOX 631 BIRMINGHAM, ALABAMA
FILTERS • EVAPORATORS • PROCESS EQUIPMENT • CONTRACT MANUFACTURING including HEAVY CASTINGS

Check 2231 opposite last page.



Graph paper from plain with flick of wrist

A sharp 3″ graph pattern can be reproduced anywhere with rubber hand stamp. Stamp permits easy inclusion of graphed material in engineering reports and correspondence. Pattern on stamp is 100 blocks/sq in.

(Graph Stamp is product of Edmund Scientific Co., Barrington, N.J.)

Check 2232 opposite last page.

Pipe-gasket package simplifies installation

Uses: Gasketing of pipe.

Features: Each gasket is packaged in disposable cardboard template. Use of cardboard for positioning gasket eases installation.

Description: Gaskets are fabricated of perforated metal encapsulated in Teflon. Gaskets are reusable. They are available from stock in five different flange pipe sizes — ½, ¾, 1, 1½, and 2″. Standard gaskets are 1/16″ thick and ⅛″ and special thicknesses may be ordered.

Installation steps are: (1) Remove cellophane tape, (2) insert gasket and cardboard template into position, (3) place bolts through template holes and tighten, (4) tear out template.

(Task-line Gaskets are product of Modern Industrial Plastics Division, The Duriron Company, Inc., 3337 N. Dixie Drive, Dayton 14, Ohio.)

Check 2233 opposite last page.

FIGHT FOAM FAST! with SAG SILICONE ANTIFOAM

Now, from the laboratories of UNION CARBIDE, come new SAG Silicone Antifoams . . . that *fight foam fast!*

SAG Antifoams were developed after years of research to find the most efficient method of fighting foam. SAG Antifoams are effective in small quantities — often less than 10 parts per million! There are two types: SAG 470 *Emulsion* for aqueous systems; SAG 47 *Fluid* for non-aqueous systems. Only a few cents' worth eliminates thousands of cubic feet of costly, space-eating, storage-killing foam.

You'll like having SAG Antifoams handy. They are shipped to you ready to use and are stable in storage.

TRY SAG! Write for a handy sample today. This coupon makes it easy!

UNION CARBIDE SILICONES

SILICONES DIVISION Dept. EG-4706
Union Carbide Corporation
30 East 42nd Street, New York 17, N.Y.
Send sample of ( ) SAG 470 emulsion; ( ) SAG 47 fluid; and data on SAG Silicone Antifoams.

Name_____ Title_____
Company_____
Address_____
City_____ State_____

"Union Carbide" and "SAG" are trade-marks of UCC.

Check 2234 opposite last page.

NEW LITERATURE
Plant Engineering
Maintenance & Safety

V-belt drives are covered in 36-page bulletin, including drive-selection tables for stock and non-stock sheaves, hp tables, nomographs for service-level comparisons of drive costs, sheave and belt specifications, bushing and keyseat specifications, installation instructions for sheaves, and information on checking tension of V-belt drives. Bul 9102 — T. B. Wood's Sons Company.

Check 2235 opposite last page.

Hose, fittings, self-sealing couplings and related products are detailed in 38-page catalog containing specifications for these items for use in various applications. Cat 204 — Aeroquip Corporation.

Check 2236 opposite last page.

Positive-displacement rotary pump is presented in four-page bulletin which gives details and schematic drawing of unit for 200-psi service and has top speed of 500 rpm. Several photos illustrate pump features. Bul P-302 — Waukesha Foundry Company.

Check 2237 opposite last page.

Flexible couplings are considered in 48-page catalog which includes photographs, detailed drawings and specification tables on line of double-flexing, full-floating-shaft, semi-floating-shaft, and heavy-radial-load types. Catalog starts out with handy flexible-coupling selection and load-classification tables. Engineering Cat 60 — Thomas Flexible Coupling Company.

Check 2238 opposite last page.

Vertical motor reducers and in-line reducers are subject of 28-page catalog which is complete selection guide. Construction and mechanical features are detailed, along with load characteristics including hp and torque ratings, overhung loads and maximum-allowable-thrust loads. Cat MR-58 — Philadelphia Gear Corporation.

Check 2239 opposite last page.

Molded-case circuit breakers, individually enclosed low-voltage-power circuit breakers and engineered products are topics of sections of 60-page catalog. Latter section furnishes information on features and ratings for switchgear, primary- and secondary-unit substations, transformers, interrupter switches, power-switching centers and other engineered products. Speedfax Cat — I-T-E Circuit Breaker Company.

Check 2240 opposite last page.

How American Brake Shoe Maximates Production

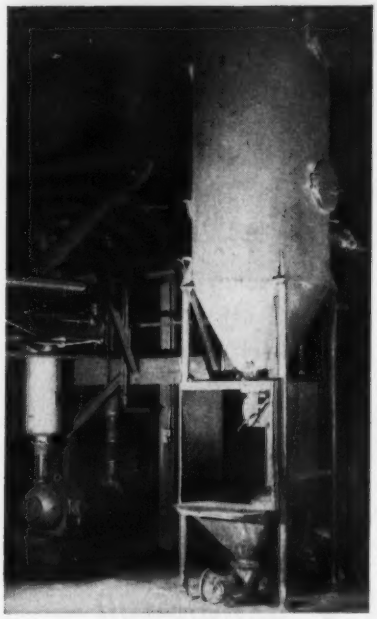
When the American Brake Shoe Company began an extensive modernization program at its New Castle, Delaware plant, one of the first steps management took to maximate production—that is achieve maximum output at less cost—was to install a Hoffman pneumatic conveying system for keeping bentonite, dextrin, silica flour and other materials *on the flow.* With a Hoffman exhauster furnishing the air as well as suction for the handling system, and use of components described here, the equipment not only simplified bulk conveying chores but paid its way in a few months by providing substantial production, material and labor savings.

MATERIAL INTAKE VALVE

Materials are introduced into the air stream through a unique non-clogging intake valve attached to the bottom of a hopper and flow smoothly through pipe lines to any one of six primary cyclone storage tanks more than 350′ distant. Hoffman intake valves insure the uninterrupted flow of dry, powdery or granular materials through all types of vacuum conveying systems. Suitable for use with 2″ through 6″ pipelines, they are equipped with standard 8″ flanges and can be easily attached to bins, hoppers, or dust collectors. Connected equipment is protected from exposure to the full suction of the system by a separate air inlet. The material handling rate can be adjusted while air is flowing. Thorough mixing insures smooth transit.

HINGE VALVE

Self-cleaning Hoffman hinge-type discharge valves are designed for air-tight closure against a head of material. The one-piece valve body is cast of gray iron with its rubber-faced disc and seat completely inside the casing. Lever linkage permits operation by means of chain or cable from a remote station. Provision can also be made for air or hydraulic cylinder actuation of the valve.



A portion of the Hoffco-Veyor system installed at the American Brake Shoe Co. plant in New Castle, Delaware.

ROTARY VALVE

Chain driven rotary discharge valves of cast semi-steel construction feed the material in controlled quantities. Designed for interchangeability of various types of fabricated and cast rotors, valves are equipped with torque limiting drive sprockets for protection against jamming and overloading. Equalizing connections permit attachment of bleed lines to vacuum or pressure source. Inspection of the interior can be made through an access port without disassembly of the valve.

PERISTALTIC VALVE

Controlled expansion and contraction of rubber diaphragms permit discharge in measured quantities. Since there are no internal moving parts, even coarse abrasives can be handled with minimum wear. Sheet rubber diaphragms are easily replaced whenever necessary.

COMPETITIVE ADVANTAGES

In handling quantities of dry, free-flowing powdery and granular materials such as sand, shot, chemicals, etc., Hoffco-veyor systems and components speed production—provide many genuine benefits and advantages which are reflected in higher profit margins. These include:

- flexibility
- cleanliness
- time saving
- lower initial cost
- easy installation
- material saving
- labor saving
- pay for themselves

FREE ENGINEERING SERVICE

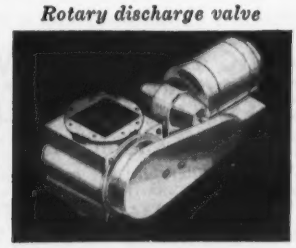
If you have a materials handling problem, you can solve it with either a complete Hoffman system or any of its parts which may be purchased separately to fit your needs. Available equipment includes dependable centrifugal blowers/exhausters, cyclones, collectors, material intake, hinge, rotary, butterfly and peristaltic valves as well as filter bag collectors. We'll be glad to make a free engineering survey to determine how you can improve your manufacturing methods by maximating production with a really tight method of material handling. Send now for a free descriptive booklet. Please write:

Air Appliance Division
Dept. EM
U. S. Hoffman Machinery Corp.
103 Fourth Avenue
New York 3, New York

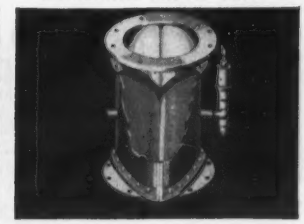
Material intake valve

Hinge valve

Rotary discharge valve



Peristaltic rubber valve



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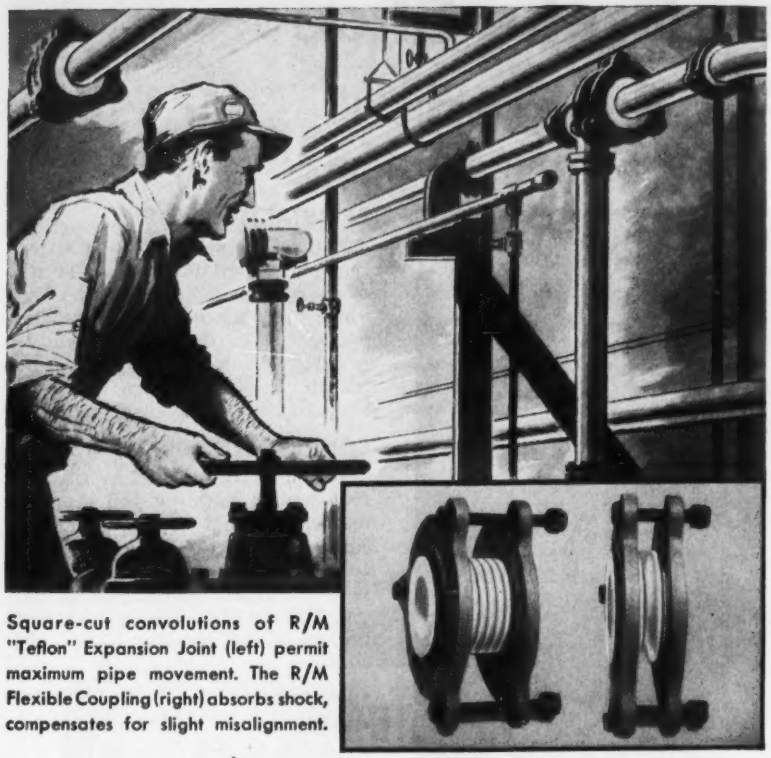


Square-cut convolutions of R/M "Teflon" Expansion Joint (left) permit maximum pipe movement. The R/M Flexible Coupling (right) absorbs shock, compensates for slight misalignment.

Best way to beat ✓expansion ✓vibration ✓misalignment of corrosion-resistant piping:

R/M "TEFLON" EXPANSION JOINTS AND COUPLINGS

Wherever you use glass, plastic or other corrosion-resistant piping, you need R/M "Teflon"* Expansion Joints and Flexible Couplings to take the brunt of surge, expansion and contraction, vibration and misalignment.

R/M "Teflon" Couplings and Expansion Joints are made from a single piece of "Teflon" in standard pipe sizes from 1 to 12 in. They are fitted with cast-iron flanges to ASME and Corning drill patterns. R/M Expansion Joints are designed for pressures from 20 to 85 psi, according to sizes and operating temperatures.

High-pressure expansion joints, step-down couplings, and other special configurations are also available. Send your problems in "Teflon" to R/M—first in *complete "Teflon" service.* Call the nearest office listed below or write Plastic Products Division, Raybestos-Manhattan, Inc., Manheim, Pa.

*Du Pont TM for its TFE-fluorocarbon resins

R/M

PLASTIC PRODUCTS DIVISION
RAYBESTOS-MANHATTAN, INC.
Manheim, Pa.

BIRMINGHAM 1 • CHICAGO 31 • CLEVELAND 16 • DALLAS 26 • DENVER 16 • DETROIT 2
HOUSTON 1 • LOS ANGELES 58 • MINNEAPOLIS 16 • NEW ORLEANS 17 • PASSAIC • PHILADELPHIA 3
PITTSBURGH 22 • SOUTH SAN FRANCISCO 5 • SEATTLE 4 • PETERBOROUGH, ONTARIO, CANADA

SPECIALISTS IN ASBESTOS, RUBBER, ENGINEERED PLASTICS, SINTERED METAL

Check 2242 opposite last page.

Fan and blower line is detailed in 96-page catalog which includes section incorporating review of engineering fundamentals, exhaust-systems calculations, corrosion data, information on air volume in ducts, pressure tables, ejector-systems data, velocity and velocity-pressure table, data on fume exhausting for metal cleaning and finishing, drying temperatures for various materials, air-exhaust-systems calculations and data on pipe systems. Bul IF-100 — General Blower Co., Subsidiary of ILG Electric Ventilating Co.

Check 2243 opposite last page.

Fire-fighting equipment is tabulated in 28-page catalog, incorporating engineering facts and specifications on automatic sprinkler, CO_2, smoke-detection, dry-chemical, and foam systems. Also covered are fire-hose and extinguisher cabinets, fire-hose racks and reels, Siamese connections, and portable extinguishers. Form S-62 — The Fyr-Fyter Company.

Check 2244 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Magnetic clutches and their applications are treated in 18-page technical booklet which deals extensively with background theory and with various principles involved. "Magnetic Clutches and Their Applications" — PIC Design Corporation, Subsidiary of Benrus Watch Company, Inc.

Check 2245 opposite last page.

Tube-fitting line of butt-joint type is expanded upon in 44-page catalog which includes nomographic flow chart. Cat 3108 — The Imperial Brass Manufacturing Co.

Check 2246 opposite last page.

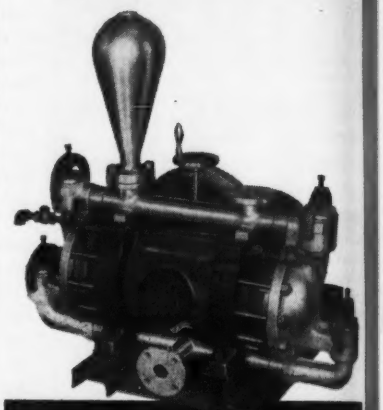
Electronic components of various plastics, are cataloged in 24-page bulletin which outlines mechanical and electrical design and environmental characteristics of products. Bul AD-169 — The Garlock Packing Company.

Check 2247 opposite last page.

Lubricant which is concentrated dispersion of colloidal molybdenum disulfide in an LB series Ucon lubricant, is subject of single-sheet 'dag' Dispersion 207 Data Sheet — Acheson Colloids Company, Division of Acheson Industries, Inc.

Check 2248 opposite last page.

NEW FEATURES INCREASE SERVICE LIFE



the NEW SHRIVER DIAPHRAGM PUMP *for those* "TOUGH" MATERIALS

- Simplified drive and diaphragm support mechanism increase operating life and facilitate maintenance.
- Complete diaphragm support mechanism may be removed as a unit, without disturbing existing piping.
- Liquid ends may be removed easily for inspection and cleaning.
- Slurry blow-off protects pump in event of diaphragm failure in operation. Slurry cannot affect working mechanism.
- Adjustable stroke—optional—available for varying pump capacity; without need for expensive variable speed drive.
- Pumps at discharge pressures to 100 psi, lift of 10′ of water for long periods, 15′ to 18′ for short periods.

Learn why this easy-to-clean, simple-to-maintain pump is right for your corrosive, abrasive, viscous, thick, heavy, quick-settling or sensitive fluids. Write for Bulletin 143.

T. SHRIVER & CO., Inc.
846 Hamilton St., Harrison, N. J.
Sales representatives in
Atlanta, Buffalo, Chicago, Detroit,
Houston, Los Angeles, St. Louis, San Francisco,
Montreal, Toronto, Mexico City

Check 2249 opposite last page.

recent books

Soviet research on the lanthanide and actinide elements is detailed in five-part Chemistry Collection series, in English. Part 1—Basic Chemistry; Part 2—Analytical and Separation Chemistry; Part 3—Nuclear Chemistry and Nuclear Properties; Part 4—Geology; Part 5—Nuclear Fuel Technology. Series is available at $65 from Consultants Bureau, Inc., 227 West 17th St., New York 11, N.Y.

Check 2250 opposite last page.

Gas Purification processes and techniques are covered in 556-page book written by A. L. Kohl and F. C. Riesenfeld, The Fluor Corporation, Ltd. Corrosion, foaming, and materials of construction are discussed to help reader solve problems likely to arise in operation of commercial units. Emphasis is placed on purification processes common to more than one field. References to additional reading are listed at end of each of the book's 14 chapters. The book is highly recommended for design and process engineers.

To obtain "Gas Purification" remit $15.00 to McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N.Y.

Perfumes, cosmetics and soaps, with a special reference to synthetics, are concisely detailed in two volumes. Volume One, a dictionary, deals exclusively with raw materials, together with an account of the nomenclature of synthetics. Volume Two is a treatise on manufacture and application of perfumes of all types. To obtain "Perfumes, Cosmetics and Soaps" remit $12.50 per volume to D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, N.J.

Check 2251 opposite last page.

"Handbook Of Chemistry and Physics," 41st Edition, contains over 3400 pages in five indexed sections. To obtain this long recognized standard reference book remit $12 to Chemical Rubber Company, 2310 Superior Ave., Cleveland 14, Ohio.

Check 2252 opposite last page.

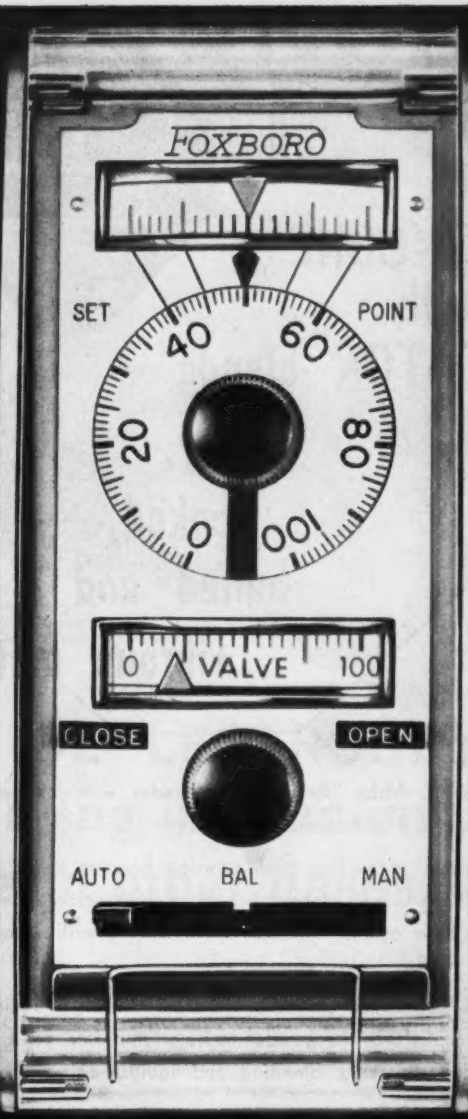
Automating the manufacturing process is subject discussed in this 148-page volume by George F. Hawley, Director of Development & Engineering, Automation Laboratory, Inc., Stamford, Connecticut. It is written in easy, well-illustrated style and presents some of the pitfalls and problems involved in development and use of special automatic machinery. To obtain "Automating The Manufacturing Process" remit $4.95 to Reinhold Publishing Corporation, 430 Park Avenue, New York 42, New York.

Measurement deviation...

plus indication...

plus valve position...

you get them all with this **Foxboro electronic control station**



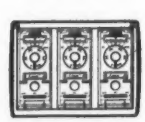
Shown here actual size →

One 3" x 6" panel station containing all control and supervisory functions — that's the Foxboro Electronic Consotrol* Controller. All d-c input — all d-c output — all solid state. Operates completely independent from recording.

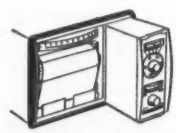
And look at these other features:

- measurement and deviation indicator gives continuous indication of process measurement as well as showing the deviation from set point.
- calibrated set point dial, with 4¾" scale, used with deviation indicator for readability of ½% full scale.
- valve position indicator for continuous, horizontal-scale indication of valve opening.
- simple auto-manual transfer switch for smooth, bumpless transfer.

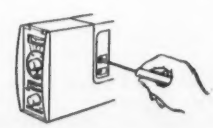
Foxboro electronic Consotrol control stations are available for cascade, ratio and auto-selector systems. Ask your Foxboro Field Engineer about them — or write for Bulletin 21-10. The Foxboro Company, 815 Norfolk Street, Foxboro, Massachusetts. *Reg. U. S. Pat. Off.*



Standard 9" x 6" housing holds 3 control stations, or 1 station with a companion recorder.



Controller and recorder each slide out from panel for easy servicing.



Proportional — reset — derivative: all adjusted from the front.

FOXBORO
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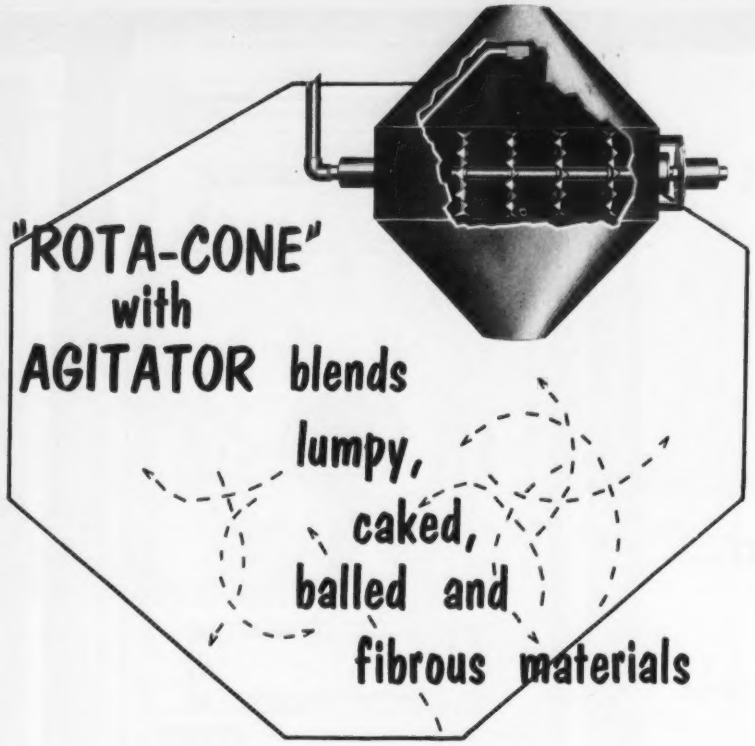


The Paul O. Abbé "Rota-Cone" Blender, with internal agitator, readily blends lumpy, caked, balled and fibrous materials.

For example, many fine mesh powders become caked into relatively firm lumps. The "Rota-Cone" blender breaks up and restores such caked or lumped materials to their original fineness for blending with other powdered ingredients.

Again where caked powders are treated with a liquid additive, the internal agitator restores the powder to its original fineness, before the atomized spray is added. Breaking, blending and liquids-addition are all accomplished in one unit.

Some materials, tend to form balls while being blended. The internal agitator prevents this "balling" and permits quick, thorough blending.

The "Rota-Cone" Blender produces blended fibrous materials from formulations including tight fibrous clusters which must be opened or fluffed before adding to the batch. It fluffs these clusters and blends—all in one operation—with high degree of efficiency.

Where shortening or other fatty content has to be cut into the powdered materials the "Rota-Cone" produces a perfect blend.

The "Rota-Cone" can help you, too, to solve your difficult blending problem.

For complete details of these Paul O. Abbé machines, write today for our 12-page Brochure "C".

PAUL O. ABBÉ
402 CENTER AVE. LITTLE FALLS, NEW JERSEY

BALL & PEBBLE MILLS
DRY & PASTE MIXERS
DRYERS & BLENDERS

Check 2254 opposite last page.

RECENT BOOKS

Plant gums and mucilages, in addition to some related polysaccharides, are comprehensively treated in the American Chemical Society's Monograph No. 141. Purpose of the book is two-fold: to evaluate critically progress made in the field; and to encourage new ideas for industrial application of gums. Edition of 627 pages is available at $18.00 per copy from Reinhold Publishing Corporation, 430 Park Ave., New York 22, N.Y.

Nature of materials, particularly from an engineering viewpoint, is emphasized in this 571-page volume by Zbigniew D. Jastrzebski. Beginning with discussion of basic concepts of interatomic and intermolecular forces, book proceeds through discussions of diffusion, crystallization and phase equilibria. Subsequent chapters deal specifically with characteristic properties and uses of a wide variety of engineering materials. To obtain "Nature and Properties of Engineering Materials" remit $11 to John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York.

Check 2255 opposite last page.

Electrical input transducers is subject of comparative study and analysis, in this work by Kurt S. Lion, Associate Professor Massachusetts Institute of Technology. Purpose of this 324-page volume is to offer research workers, engineers, and students a reasonably complete collection of existing basic methods and systems using input transducers in electrical instrumentation. To obtain "Instrumentation In Scientific Research" remit $9.50 to McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N.Y.

"Physical Methods of Organic Chemistry" is the subject of volume 1 part 1 in a series on "Technique of Organic Chemistry". This volume of over 900 pages is the first of a four-volume series devoted to the subject. To obtain "Physical Methods of Organic Chemistry" remit $24.50 to Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, New York.

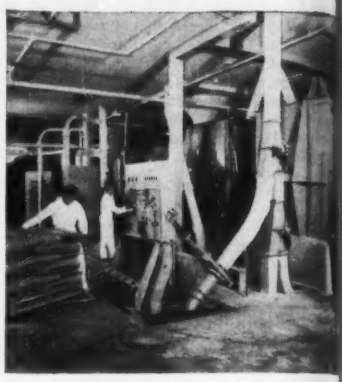
Check 2256 opposite last page.

An introduction to rubber technology is presented as a series of selected lectures in 547 pages. This book represents one of the many traditional activities of American Chemical Society's Division of Rubber Chemistry. It is a direct result of the growing educational activities of the various active rubber groups in the United States.

To obtain "Introduction to Rubber Technology" remit $10 to Reinhold Publishing Corp., 430 Park Avenue, New York 22, New York.

Problem:

To boost starch and gum production while cutting operating costs



Solution:

SPROUT-WALDRON
UNIT MACHINES AND SYSTEMS

When Morningstar Paisley executives decided to move activities to their new plant at Hawthorne, N. J., they demanded a system meeting these specifications: extreme versatility, no dust nuisance, protection against contamination, low handling and operating costs, stepped up capacity.

The answer was found in a packaged processing system involving Sprout-Waldron machinery for crushing, mixing, grinding and sifting; plus a series of four negative pressure pneumatic conveying systems.

Blending and bagging of starch, gum grinding and gum granulation are now being accomplished with a minimum of handling and maximum of efficiency. Operating costs are down, capacity up. For the full story ask for Bulletin F-19.

CW/107

SW SPROUT-WALDRON
Muncy, Pennsylvania

Size Reduction • Size Classification • Mixing
Bulk Materials Handling • Pelleting

Check 2257 opposite last page.

manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Fluids Handling

Controlled-volume-pumping discussion is contained in Bul 553-1 —Milton Roy Company.

Check 2258 opposite last page.

Forged-steel pipe fittings and flanges for high-pressure service are specified in Cat F-10—Henry Vogt Machine Co.

Check 2259 opposite last page.

Joint sealer is available in four-oz cans, 1-1/3-oz squeeze tubes and pint and 10-lb containers. Sealer is detailed in Leak Lock Bul—Highside Chemicals Incorporated.

Check 2260 opposite last page.

Steam trap, which can handle pressures of 10 to 600 psi and operates against back pressures to 50% of inlet pressure is subject of Steam Trap TD-50 Bul — Sarco Company, Inc.

Check 2261 opposite last page.

Tube-fitting data, charts, laboratory tests and formulas — on corrosion, vibration, temperature, pressure and vacuum, flow, and velocity — are included in catalog also incorporating vital statistics in hydraulic- and pneumatic-tube circuitry design. Cat 3108—The Imperial Brass Manufacturing Co.

Check 2262 opposite last page.

Steam-traps sizing, installation and maintenance, for various pressures, temperatures and loads, are summarized in Cat K—Armstrong Machine Works.

Check 2263 opposite last page.

Steam traps, which continually sample fluid in line to maintain condensate discharge close to steam temperature, thus eliminating condensate as soon as it forms, are expanded upon in Steam Trapping Bul — Yarnall-Waring Co.

Check 2264 opposite last page.

Pumps, motors and valves of various types are considered in Pumps, Motors and Valves Buls —Allis-Chalmers Manufacturing Co.

Check 2265 opposite last page.

Seamless pressure tube or pipe, of carbon or alloy, is specified in Bul TB-417—Tubular Products Division, The Babcock & Wilcox Company.

Check 2266 opposite last page.

Tape insulation, fabricated of long-fibered asbestos rovings, completely enclosed in tubular woven-asbestos jacket, is furnished with either plain or Neoprene-impregnated weather-proof jacket. Tape is subject of Insutape Engineering Data—Fibrous Products Division, Union Asbestos and Rubber Company.

Check 2267 opposite last page.

Stainless pipe unions have fully confined Teflon seals. Available in pressure ratings of 2000, 3000, 4000 and 6000 psi, for pipe sizes of ⅛ to 2", they are subject of Koncentrik Union Cat—The Special Screw Products Company.

Check 2268 opposite last page.

Welded-steel tube has advantages of smooth surfaces, predetermined uniformity of wall thicknesses and consistent roundness. Tube is subject of Bul 8591—Formed Steel Tube Institute, Inc.

Check 2269 opposite last page.

Canned pumps, with special designs and materials available for handling fluids under pressures to 5000 psi, temperatures to 1000° F and capacities to 600 gpm, are explained in Bul 1100—Chempump Division, Fostoria Corporation.

Check 2270 opposite last page.

Separation and Size Reduction

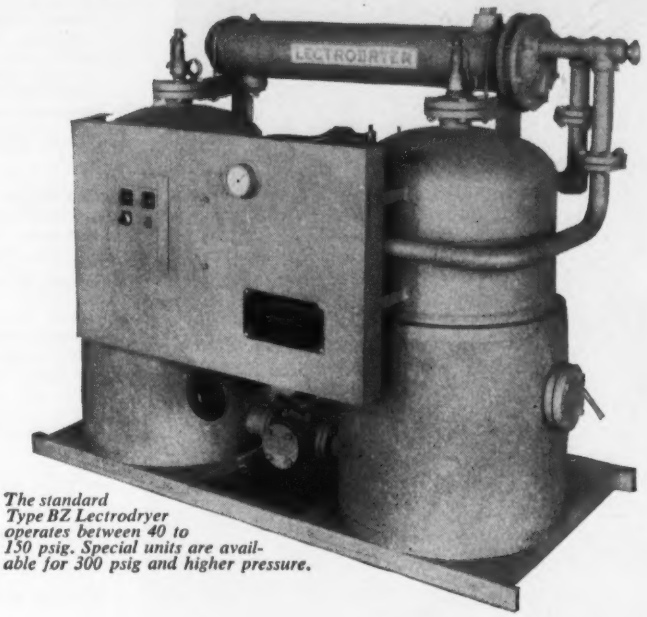
Centrifugal-air-separation formulas are presented in Air-separation Formula Bul—Rubert M. Gay Division, Universal Road Machinery Co.

Check 2271 opposite last page.

Fluid-energy mills can (while grinding) dehydrate, coat particles, blend, and achieve chemical changes. Mills are tabulated in Jet-O-Mizer Mill Bul—Fluid Energy Processing & Equipment Company.

Check 2272 opposite last page.

ANNOUNCING



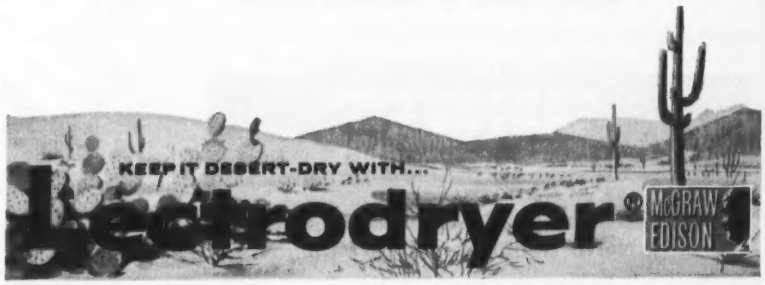
The standard Type BZ Lectrodryer operates between 40 to 150 psig. Special units are available for 300 psig and higher pressure.

NEW "BZ" LECTRODRYER for drying instrument air and other gases

For years, Lectrodryer has been known for leadership in the design and production of adsorbent dryers... with a reputation for providing extra peak load capacity, greater drying dependability. Now here's an even *better* dryer for compressed air and other gases—the new Type BZ Lectrodryer.

Special emphasis has been placed in the Type BZ Lectrodryer on sound but *simplified* mechanical design. It is fully automatic, supplying continuous drying with no attention other than occasional lubrication. Since the valves and valve mechanism move only a few times per day, there is virtually no wear—unlike units which cycle frequently.

Bulletin BZ-161 describes this new Lectrodryer in detail. For a copy, or for drying help, write Pittsburgh Lectrodryer Division, McGraw-Edison Company, 352 32nd Street, Pittsburgh 30, Pa.



Check 2273 opposite last page.

One of the Garden City Fan installations in Stark Ceramics, Canton, Ohio

The beautiful structural glazed facing tile (in fashion-right colors) from Stark Ceramics is rated top quality by tile experts everywhere. It is therefore a matter of pride to Garden City that this respected company prefers Garden City high temperature Thermal-Aire Fans on their kilns.

These sturdy fans perform at temperatures up to 1300°F. in the Stark Ceramics installation. Their design is "tailored" to specific user requirements: construction materials are carefully selected to withstand the user's operating temperatures. Air-Cooled Shafts protect bearings against heat. Result: low maintenance cost; long service life.

Hundreds of "Blue Chip" companies like Stark Ceramics are sold on Thermal-Aire Fans. Find out more about them for *your* high temperature applications to 1850°F.

WRITE TODAY for information on THERMAL-AIRE FANS and PLUG UNITS
• Radial Blade • Forward Curved

MEMBER OF AIR MOVING AND CONDITIONING ASSOCIATION, INC.

REPRESENTATIVES IN LEADING CITIES

GARDEN CITY FAN & BLOWER Co.

803 North Eighth St., Niles, Michigan

Check 2274 opposite last page.

CURRENT LITERATURE

Muller, which provides three-way kneading, smearing and spatulate action, is featured in 12-page Mulling Bul—Simpson Mix-Muller® Division, National Engineering Company.

Check 2275 opposite last page.

Centrifugal impact mills are considered in Impact Milling Bul — Entoleter, Division of Safety Industries, Inc.

Check 2276 opposite last page.

Rotary kilns, primary and secondary gyratory crushers, jaw crushers, apron feeders and ball mills are considered in five bulletins—Traylor Engineering & Manufacturing, Division of Fuller Company.

Check 2277 opposite last page.

Air separators of various types are considered in Bul 087 — Sturtevant Mill Company.

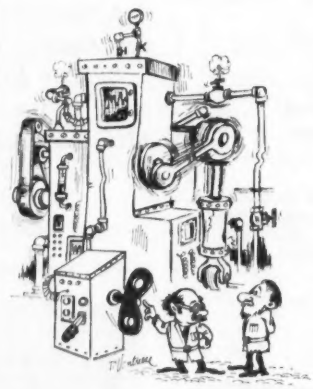
Check 2278 opposite last page.

Blending and bagging of starch, gum grinding and gum granulation are being handled with efficiency in processing system involving crushing, mixing, grinding and sifting, in addition to series of four negative-pressure pneumatic-conveying systems. Whole setup is detailed in Bul F-19—Sprout-Waldron.

Check 2279 opposite last page.

Pelletizers which utilize shearing principle are available in wide range of models and sizes with positive-feed mechanism and varispeed motor in capacities to 20 tph. Pelletizers are covered in Giant Pelletizers Bul—Taylor, Stiles & Company.

Check 2280 opposite last page.



". . . and here's where we wind it up!"

TOM VANTREESE,
UNION CARBIDE NUCLEAR COMPANY

If your pumping requirements involve pressures from 100 to 12,000 psi, temperatures up to 500°F, you'll find John Bean's pump literature extremely helpful. Get these data-packed bulletins for handy finger-tip reference . . . or avail yourself of John Bean trained and experienced engineers for immediate action.

FREE

L-66-38	Triplex Pumps, inside packed
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L-25-70	Vertical Duplex Pumps
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Check 2281 opposite last page.

WHO SWIPED PAGE 43?

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- 100% lining coverage
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NOW for the first time on all lined pails produced, a continuous smooth surface over the side seam.

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Heavy-Duty Cylinders

VALVAIR HEAVY-DUTY CYLINDERS are built to JIC standards . . . offer a full range of bore and rod sizes, interchangeable mounting styles, stroke lengths and cushioning options.

Take advantage of one-source responsibility for all your control system needs . . . cylinders, valves, manifolds, filters, regulators and lubricators . . . call in your nearby VALVAIR Field Engineer today.

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Other INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio.

Check 2283 opposite last page.

CURRENT LITERATURE

Safety

Trench covers of 75% open-metal grating do not collect grease, oil or water to create unsafe floor areas. Metal gratings of this type are among those tabulated in Grating Cat—Irving Subway Grating Co.

Check 2284 opposite last page.

Bad air, due to dangerous gases, fumes and stagnant atmosphere, hampers efficiency, safety and health and comfort of workers. Ventilators to cope with these situations are reviewed in Ventilator Information—Coppus Engineering Corporation.

Check 2285 opposite last page.

Handling acids and other corrosive materials requires hand protection such as that provided by Hycar gloves. These are topic of Sureseal Glove Bul — The Surety Rubber Co.

Check 2286 opposite last page.

Processing Equipment

Ion exchangers, for purification or concentration of chemical products, or for purification of water for process or high-pressure boiler-make-up use, are subject of Ion Exchanger Bul—Illinois Water Treatment Co.

Check 2287 opposite last page.

Scrubber has wide range of applications, including recovering catalyst dust, cupola dust and fumes, acid mists and tar fog, among others. Scrubbers are explained in Oriclone® Bul—The Ducon Company Inc.

Check 2288 opposite last page.

Processing equipment of all types is tabulated in "First Facts"—First Machinery Corp., Inc.

Check 2289 opposite last page.

Mixer with power shearing is used for blending, dispersing and homogenizing. Unit is subject of RL Hi-Shear Head Bul—Gabb Special Products Inc.

Check 2290 opposite last page.

Magnetic-pulley installation photos, selector guide and other information is contained in six-page Magnetic Pulley Bul — Eriez Mfg. Co.

Check 2291 opposite last page.

Drum rotator handles 30- and 55-gal drums for mixing, blending, tumbling and cleansing. Unit is reviewed in Drum Rotator Cat — Morse Manufacturing Co., Inc.

Check 2292 opposite last page.

LIGHT but so STRONG!

TOTELINE FIBER GLASS TRAYS

FOR DRYING—

Chemicals • Pharmaceuticals • Antibiotics

Toteline dryer trays of molded fiber glass are stronger than steel, yet they weigh TWO-THIRDS LESS! They outlast and outperform metal trays. American Cyanamid Co. reported annual savings of 50 percent after switching to Toteline Dryer Trays. You too can make substantial savings with Toteline. Here's why . . .

- Toteline Trays have a longer life and a lower replacement rate than metal trays.
- Drying time is reduced because Toteline Trays do not absorb heat.
- Higher quality is maintained because Toteline Trays have no coating to peel, flake or otherwise contaminate your product.
- Toteline Trays resist the corrosive action of non-oxidizing acids, weak alkalis and many other chemicals.
- Toteline Trays will not chip, dent or warp. They are easier and safer to handle.
- You get more plus factors in Toteline than in any metal tray.

For further information and catalog sheets on Toteline chemical drying trays, clip and mail this coupon to us with your company letterhead, furnishing us with your name and title.

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Title_____

MF 9-CP

by TOTELINE

MOLDED FIBER GLASS TRAY CO., LINESVILLE, PA.

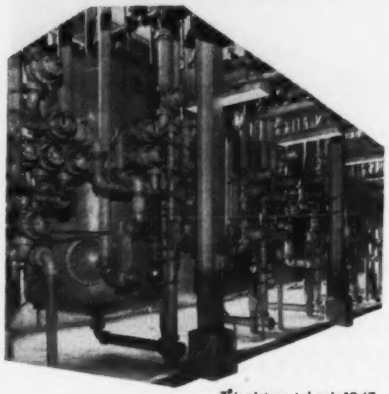
Chosen to Represent the U.S. Reinforced Plastics Industry at the 1959 International Trade Fair in Zagreb, Yugoslavia

Check 2293 opposite last page.

PATHWAYS OF A PIONEER

ILLCO-WAY DESIGNERS AND BUILDERS

MODERN EQUIPMENT FOR ionXchange



This picture, taken in 1947, shows a *fully-automatic* IonXchanger designed and built by IWT.

Leading the Way In De-I Developments

At the time the IonXchanger shown above was installed, Illinois Water Treatment Company already had a decade of design and manufacturing experience behind it. Many other firms, now selling in the field, then had yet to cut their teeth on their first small jobs.

Ash from Corn Syrup

This particular job was especially important because it pioneered successfully in one of the many process fields — other than the purification of water — where de-ionization was proving practical. The equipment is still operating at full effectiveness today in the big sugar refinery where it serves most economically to remove ash from corn syrup.

It is significant that IWT had this early experience in the design of automatic equipment, and so was ready for the widespread trend toward "automation" in many industries in recent years.

THIS EXPERIENCE CAN MEAN A LOT TO YOU

If you are considering the use of ion-exchange for the purification or concentration of chemical products, or if you need purified water for high-pressure boiler make-up or process use, be sure to take advantage of IWT pioneering experience and specialized knowledge. *Call your IWT representative.*

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILLINOIS
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.

Check 2294 opposite last page.

CURRENT LITERATURE

Glassed-steel reactors for corrosive service with all acids (except hydrofluoric) to 350° and above, depending on concentration, range in size from 300 to 4000 gal. Reactors are tabulated in Bul 988—Pfaudler Division Pfaudler Permutit Inc.

Check 2295 opposite last page.

Water-conditioning systems are detailed in Water-conditioning Systems Bul—Allis-Chalmers Manufacturing Co.

Check 2296 opposite last page.

Kettle line includes 2/3-jacketed, 80- to 300-gal (CW); 2/3-jacketed, 5- to 500-gal (A); 2/3-jacketed, 5- to 100-gal (C); centerline scraper-agitator, 80- to 300-gal (CW3T); full-jacketed, 10- to 300-gal (B); and 2/3-jacketed, 40- to 200-gal (Pressure) models. These are pictured in A, B, C, CW, CW3T and Pressure Kettle Buls—Lee Metal Products Company, Inc.

Check 2297 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Pulp tanks, in capacities of 500 to 2000 gal, and storage tanks, in capacities of 100 to 5000 gal, are considered in Pulp Tank and Storage Tank Buls—Lee Metal Products Company, Inc.

Check 2298 opposite last page.

Heat exchangers (572); centrifugal pumps (567); fittings, valves and stainless-steel tube (559); laboratory processing vats (545); and automatic system for heating and cooking of pumpable products (583) are covered by Buls G-572, G-567, G-559, G-545 and G-583—Cherry-Burrell Corporation.

Check 2299 opposite last page.

Processing equipment, is subject of Processing Equipment Bul—Sun Shipbuilding & Dry Dock Company.

Check 2300 opposite last page.

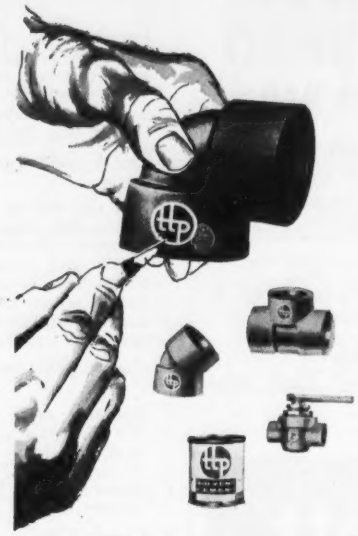
Vacuum pans, in capacities of 10 to 500 gal, and quick-cooling pans, with capacities of 50 to 200 gal, are subjects of Vacuum and Quick-cooling Pan Buls—Lee Metal Products Company, Inc.

Check 2301 opposite last page.

Screeners, which are available in over 30 standard models with from one to five screen surfaces, and coolers are reviewed in Coolers and Screeners Buls—The Orville Simpson Company.

Check 2302 opposite last page.

Reduces piping costs ...stops corrosion

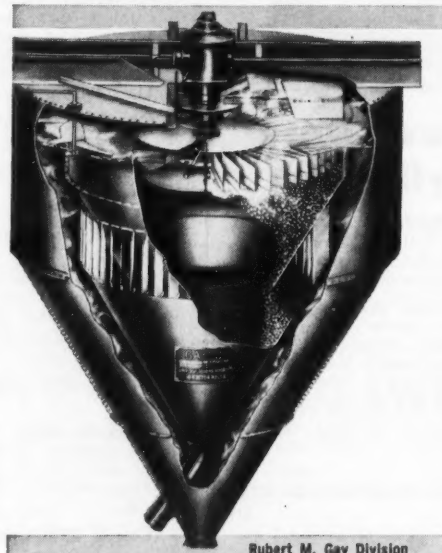


Plants, large and small, are switching to unplasticized polyvinyl chloride (UPVC) piping for corrosive service to make these important savings in first costs and in operating costs. UPVC piping materials cost substantially less than metals, alloys or lined material commonly used in the same services. It can be erected easily and quickly. Widely used socket type joints can be made in about a minute with solvent cement and a brush. UPVC piping is easy to handle...weighs less. It does not have to be painted. It stops piping corrosion and galvanic action.

The ttp line of injection molded UPVC fittings, flanges, valves, solvent cement and thread lubricant is available nearby from your Tube Turns Plastics' Distributor. He can supply *all* your needs on one order and can help you with design and installation data. Write us for the complete line catalog, Bulletin 119. TUBE TURNS PLASTICS, INC., Dept. CP-5, 2929 Magazine Street, Louisville 11, Kentucky.

Check 2303 opposite last page.

USING SCREEN SEPARATIONS? NOTHING CLASSIFIES AS PERFECTLY AS AIR



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Classify practically all dry fine materials

You get:
- CLOSER SEPARATIONS
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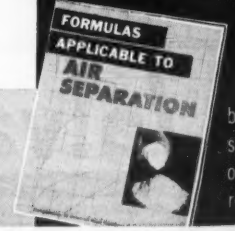
- NO UNDESIRABLE OVERSIZE.

RANGE 60 to 400 mesh. Timken bearings. Choice of Standard or Heavy-Duty Models.



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Check 2304 opposite last page.

CURRENT LITERATURE

Mixers treated in RE Lightnin® Mixers Bul—Mixing Equipment Co., Inc.

Check 2305 opposite last page.

Continuous dehydrators, for deliquefying crystalline solids and fibrous pulps at high capacities, are available in four sizes with solids-handling capacities to 70 tph or more. Units are tabulated in Continuous Dehydrator Bul—The Sharples Corporation.

Check 2306 opposite last page.

Packaging

Steel containers, available in sizes of 1 through 55 gal are considered in Steel Container Cat—Vulcan Containers Inc.

Check 2307 opposite last page.

Lined drums in which lining thicknesses are controlled to within 1/10 mil, are topic of Lined Drum Bul—Rheem Manufacturing Company.

Check 2308 opposite last page.

Squat jars, available from stock in nine sizes in clear polystyrene or linear polyethylene. Jars, which can also be molded in wide range of colors to meet special requirements, are subject of Squat Jar Cat—Celluplastic Corporation.

Check 2309 opposite last page.

Stainless-steel containers, which incorporate full-curled tops and bottom rings, will hold approximately 15-½ gal. They are reviewed in Stainless-steel Container Bul — Pressed Steel Tank Company.

Check 2310 opposite last page.

Gas cylinders are detailed in Gas Cylinder Bul—Harrisburg Steel Co., Division of Harsco Corporation.

Check 2311 opposite last page.

Sealing and color-coding of ink cannisters can be done in one step with paper tape which may be printed with specifications, instructions and/or product name. Available in six colors, tape is outlined in Paper Tape Bul—Minnesota Mining and Manufacturing Co.

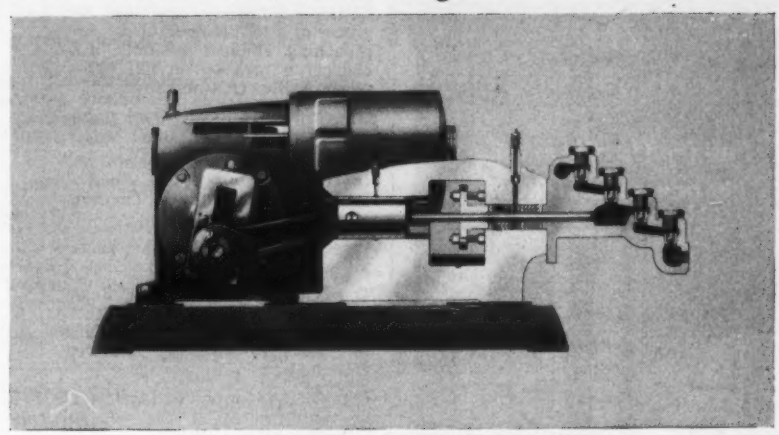
Check 2312 opposite last page.

Drying and Heating

Dryer line incorporates type of construction providing prefabricated structure, with trussed-and-tensioned insulated panels. Units are delineated in Dryer Bul—The National Drying Machinery Co.

Check 2313 opposite last page.

how to meter slurries accurately



Standard Motor Driven Controlled Volume Pump

FEW pumping jobs present more complex problems than the accurate metering of slurries. Since they are often abrasive, slurries can make the selection of pump parts extremely difficult. Minute particles settling out in the packing can score a plunger beyond usefulness in minutes. And viscous, tacky slurries can limit ball check freedom and reduce accuracy. But even the toughest slurries *can* be metered accurately . . . by adhering to good slurry handling practice, and by choosing the right pump for the job.

Keep Slurries In Suspension

Several practices that have proved valuable in this difficult service are aimed at keeping the solids in suspension. Suction and discharge lines should be as short as possible. The supply tank should always be well agitated. And if packed plunger pumps are used, stroking speed should be held between 45 and 75 rpm to minimize settling.

Choosing The Right Pump

Controlled volume pumps are manufactured in a sufficient variety of designs to provide a full range of desired characteristics for slurry service. An economy pump such as Milton Roy's H20® can handle slurries up to 5% by weight. Standard motor driven pumps, with minor modification, can handle much denser slurries. And the new ODS (Oliver Diaphragm Slurry*) controlled volume pump can easily manage slurries containing up to 60% solids by weight.

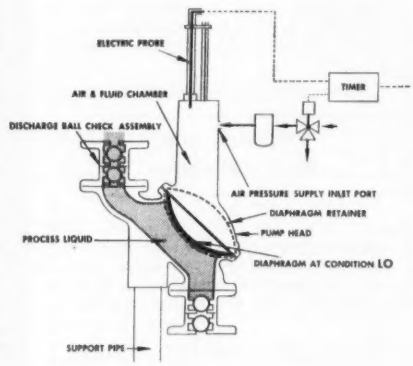
Packed Plunger Pumps

Because the entire liquid end of a packed plunger pump is in intimate contact with the slurry, considerable attention must be paid to materials selection. Ball checks and plunger should be as hard as possible, and seats should be relatively soft. Balls are usually made of Hastelloy D, 440 stainless, or ceramic, while 316 stainless is standard for the seats. The plunger must be extremely hard, and high strength sintered alumina is generally recommended.

*Manufactured under exclusive license granted by Dorr-Oliver Inc.

Proper packing maintenance in slurry service demands that packing be flushed out continuously. An internal flush, continuously bleeding a small amount of liquid along the plunger, is the most common. Dangerous liquids may require an external flush arrangement. Liquid is continuously fed in on one side of the lantern ring, drawn around the plunger, and carried away from the other side.

The ODS Controlled Volume Pump



Capable of pumping 180 gph of slurries at accuracies of ± 2% against pressures up to 90 psi, the ODS has no plunger, no packing. It consists of two opposed chambers separated by a slack diaphragm. A three-way solenoid alternately pressurizes and bleeds air from the upper chamber. With the upper chamber at atmospheric pressure, the suction head forces slurry into the lower chamber. Then, when the upper chamber is pressurized, the diaphragm forces the slurry out through the specially designed ball check valves.

Problem Slurries

Yes, slurries *can* be metered accurately. And the best proof of this claim is the thousand or more Milton Roy pumps successfully metering slurries in the field. The list includes such problem liquids as an 80% coal slurry, a 45% suspension of lead peroxide in butyl phthalate, 15 to 20% diatomaceous earth slurries, finely divided nickel catalytic suspensions, gold ore slurries, and even a 55% by weight powdered aluminum suspension.

Write for a general introduction to controlled volume pumping given in Catalogs 553-1 and 1158. Milton Roy Company, 1300 East Mermaid Lane, Philadelphia 18, Pa.

milton Roy
CHEMICAL INSTRUMENTATION SYSTEMS

Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 2314 opposite last page.

a

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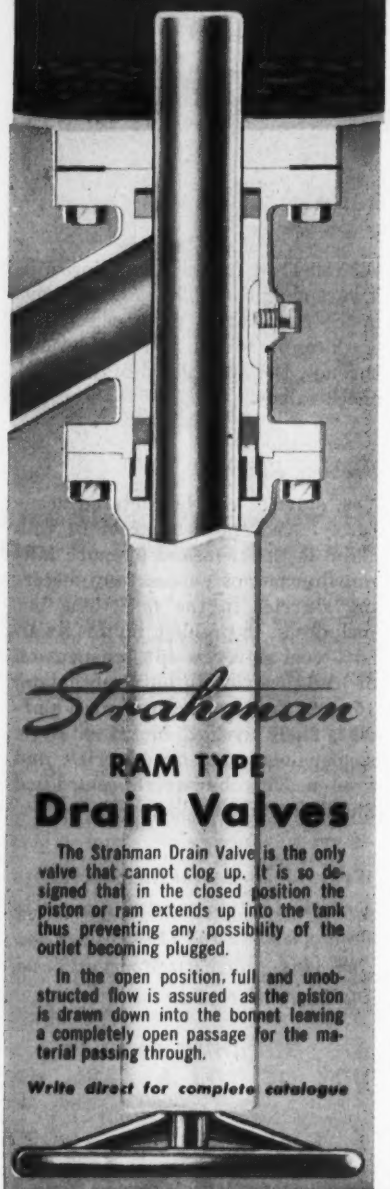
Designed for Chemical and Pharmaceutical Industries



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RAM TYPE

Drain Valves

The Strahman Drain Valve is the only valve that cannot clog up. It is so designed that in the closed position the piston or ram extends up into the tank thus preventing any possibility of the outlet becoming plugged.

In the open position, full and unobstructed flow is assured as the piston is drawn down into the bonnet leaving a completely open passage for the material passing through.

Write direct for complete catalogue

STRAHMAN VALVES, INC.

NICOLET AVE., FLORHAM PARK, N. J.

Check 2315 opposite last page.

CURRENT LITERATURE

Heat exchanger incorporates self-contained fluid cooling system in cooling industrial machines or processes to temperatures approaching ambient wet-bulb. Exchanger is reviewed in Bul 132—Niagara Blower Company.

Check 2316 opposite last page.

Dryers for humidity control are covered in Dryer Data Sheet—Pittsburgh Lectrodryer Division, McGraw-Edison Company.

Check 2317 opposite last page.

Ovens, of electric, gas or steam design in bench, cabinet, truck and conveyor types are specified in Bul 127—W. S. Rockwell Company.

Check 2318 opposite last page.

Oil- and gas-burner combustion-research laboratory is presented in Bul 759—National Airoil Burner Co., Inc.

Check 2319 opposite last page.

Ovens and dryers of both batch and conveyor types for service to 1000° F are reviewed in Bul 157—Young Brothers Co.

Check 2320 opposite last page.

Plate-coil heat-exchanger panels incorporate multi-zone principle. Steam is distributed to all levels of coil quickly, overcoming condensate-trapping problems. Development is expanded upon in Bul P61—Platecoil Division, Tranter Manufacturing, Inc.

Check 2321 opposite last page.

Fiber-glass trays for drying are specified in Toteline Trays Data Sheet—Molded Fiber Glass Tray Co.

Check 2322 opposite last page.

Filtration and Dust Collection

Dust filters which are automatically self-cleaning by reverse air are tabulated in 36-page Cat 104—The W. W. Sly Manufacturing Co.

Check 2323 opposite last page.

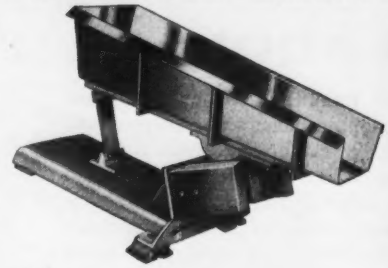
Hydraulic oil filter is detailed in Hydraulic Oil Filter Bul—The Hilliard Corporation.

Check 2324 opposite last page.

Filtration of air and gases on remote air-intake lines for engines, compressors or industrial-heating furnaces is possible with in-line filters. Units are detailed in Air Filter Buls—The Air-Maze Corporation, Subsidiary of Rockwell-Standard Corporation.

Check 2325 opposite last page.

feed bulk materials at high rate



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VIBRATORY FEEDERS

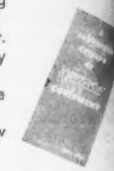
—help reduce chemical, food, and drug processing and packaging costs.

First, by dependable flow feeding of material to process equipment.

Second, by instant flow control, the power of vibration is instantly controllable for more uniform flow.

Third, by simplicity of design. The powerful electromagnetic drive assures long, trouble-free service with low maintenance costs.

Install SYNTRON Vibratory Feeders for efficient, dependable, low cost handling of all your bulk materials.



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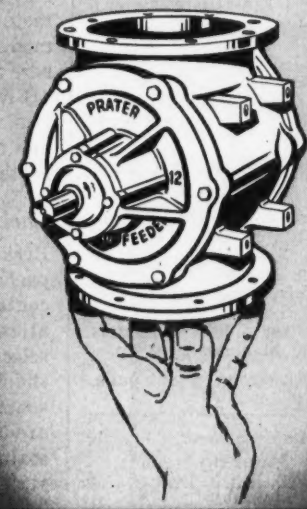
ROTARY AIRLOCK FEEDERS

for DUST CONTROL and PNEUMATIC CONVEYING

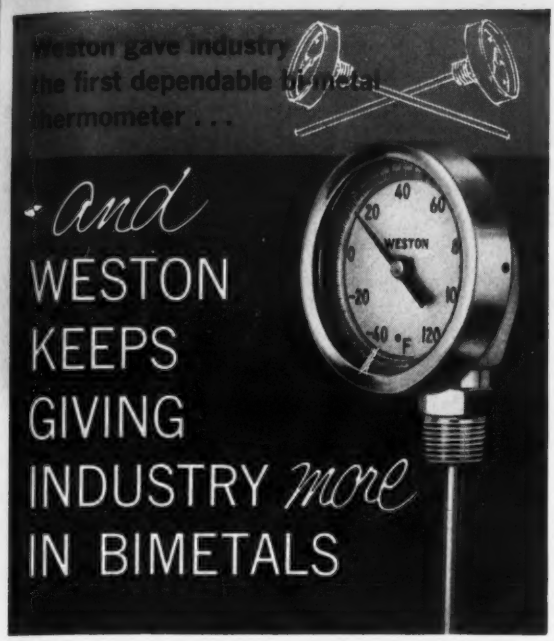


WRITE FOR BULLETIN P58

PRATER PULVERIZER COMPANY

1513 South 55th Court • Chicago 50, Illinois

Check 2327 opposite last page.



Yes, Weston gives you more: the broadest line—from which you can choose thermometers exactly suited to your process . . . more of the features you want – for convenience, readability, accuracy and long service . . . more quality—in the famous Weston tradition of fine craftsmanship.

- **All stainless steel construction, including welds**
- **In-line scales and pointers eliminate parallax errors**
- **External adjustment feature located at side of instrument provided as standard equipment**
- **Removable bezels for easy window replacement in the field**
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- **Guaranteed accuracies within 1% of range over entire scale**
- **Full line of sizes, stem lengths and ranges in back and bottom-connected models**

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WESTON INSTRUMENTS DIVISION
World leader in measurement and control

Check 2328 opposite last page.

CURRENT LITERATURE

Strainer elements and housings are detailed in Strainer Cat—Multi-Metal Wire Cloth Co., Inc.

Check 2329 opposite last page.

Hydraulic filters for in-line service on either pressure or suction side of pump, are specified on single-sheet Bul IL-F605—Arrow Tools, Inc.

Check 2330 opposite last page.

Automatic filter has horizontal-plate cake stability plus automatic cake discharge. Unit is specified in HRC Filter Information—Sparkler Manufacturing Company.

Check 2331 opposite last page.

Plant Engineering and Maintenance

Aluminum (19051), cleaning and maintenance of aluminum (10508), and aluminum pipe and fittings (10197) are covered in Buls 19051, 10508 and 10197—Aluminum Company of America.

Check 2332 opposite last page.

Compressors of horizontal, balanced-opposed type are built in wide range of combinations of crankthrows, cylinder arrangements and stages for pressures to 15,000 psig and sizes to 5000 hp. Line is itemized in Class FE Compressor Bul—Chicago Pneumatic.

Check 2333 opposite last page.

Tube expander, which incorporates trigger-controlled explosion-proof air motor in single unit, for tubes of ¼ to 3". Unit is reviewed in Tube Expander Literature—Elliott Company.

Check 2334 opposite last page.

Packaged compressor of 300-hp class is pictured in six-page Bul 92—The Cooper-Bessemer Corporation.

Check 2335 opposite last page.

Prefabricated buildings can be made in wide variety of types by utilization of extensive selection of pre-engineered components. Buildings are topic of Prefabricated Buildings Bul—Butler Manufacturing Company.

Check 2336 opposite last page.

Rotary joint which is self-supporting is outlined in Bul S-3002—The Johnson Corporation.

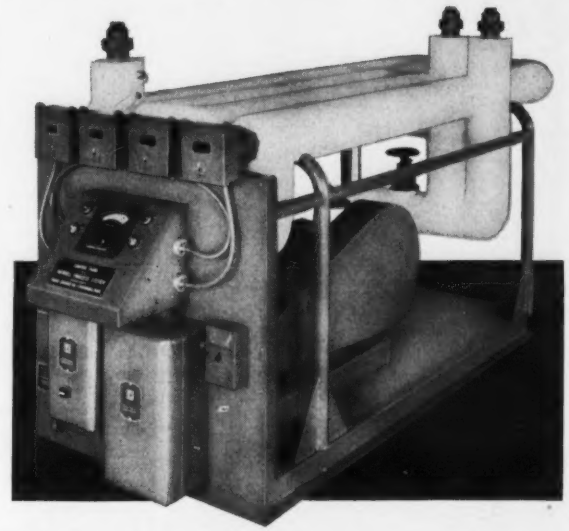
Check 2337 opposite last page.

Electrical generation and distribution equipment line is reviewed in Electrical Gen. and Electrical Dist. Bul—Allis-Chalmers Manufacturing Co.

Check 2338 opposite last page

HI-TEMPERATURE LO-PRESSURE

liquid phase heat transfer systems



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—Your product temperature requirements are high
—You want to avoid high pressure equipment
—You need close temperature control and safe, automatic operation at reasonable cost . . .

. . . . You should consider a space saving, all electric, Merrill Process System. Heating mediums can be Oil, Aroclor® or Dowtherm®.

A twist of the wrist puts these systems into operation—and they will hold fluid temperatures to within ±2°F. within the range of 200-600°F.

Heat exchangers can be factory mounted and piped when a cooling cycle is required.

Dual systems are available having two completely independent circuits with separate control systems providing heating and/or cooling in sequence, simultaneously, or in any combination in the same unit.

Low watt density finned heating elements protect the heating medium and are readily accessible for routine maintenance. Relief valves, limit switches and positive displacement pumps assure safe, dependable operation. An expansion tank, vented to atmosphere, precludes contact of air with the circulating medium and prevents pressure build-up.

All of the Electric Merrill Process Systems have push button operation from a single control center.

Capacity of available systems ranges from 25,000 Btu/hr. to 500,000 Btu/hr. or up to limits of available power. Heating elements wired for 230-3-60 only in Pilot Plant series to 100,000 Btu/hr., and 230,460, or 550-3-60 in larger units. Control circuit is for 110V 60.

Write for Bulletin 597 giving details of the Pilot Plant Series or send us your requirements.

MERRILL PROCESS SYSTEMS

Parks-Cramer Company
FITCHBURG 12, MASS.

Check 2339 opposite last page.

Plant Trenches NEED CLEAN, DRY COVERS

TRENCHES in floors of industrial plants often house subsurface pipes, valves, etc. Often these trenches are covered with cast iron plates or wooden boards which collect grease, oil or water, making unsafe floor areas.

Trench covers of 75% open Irving metal grating remain safe because they will not collect these substances. In addition to providing drainage and traction, grating sections can be easily removed for access to trenches.

★

Manufacturers of Riveted, Pressure-Locked and Welded Gratings in Steel, Aluminum and other metals for over 50 years.

"A Fitting Grating for Every Purpose"

Catalog on request

IRVICO

IRVING SUBWAY GRATING CO., Inc.
Originators of The Grating Industry Est. 1902
Offices and Plants at:
5050 27th St., LONG ISLAND CITY 1, N.Y.
1850 10th St., OAKLAND 20, CALIFORNIA

Check 2340 opposite last page.

CURRENT LITERATURE

Galling, seizing and resultant destruction of threaded parts can be combated with three products—Silver Goop, to prevent seizing and galling of threaded parts, regardless of applied load, at temperatures to 2100°F; Blue Goop, for titanium, stainless steel, steel, aluminum and high-temperature alloys for temperatures to 400°F; and High Purity Goop, for titanium, stainless steel, steel, aluminum and high-temperature alloys for temperatures to 400°F (for uses where product contamination is important). These are detailed in Silver Goop, Blue Goop and High-Purity Goop Buls—Crawford Fitting Company.

Check 2341 opposite last page.

Lubricating and sealing oil which is contaminated can be recovered through use of oil reclaimer which is reviewed in Oil Reclaimer Bul—The Hilliard Corporation.

Check 2342 opposite last page.

Box car pullers which utilize wire rope permit one man to spot quickly several loaded box cars. Puller is delineated in Bul 753—Standard Products Division, Stephens-Adamson Mfg. Co.

Check 2343 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Wedge manway assembly consists of three metal parts—ring, cover and key wedge, in addition to standard gasket. Supplied as packaged assembly, unit is detailed in Wedge Manway Bul—Lenape Hydraulic Pressing & Forging Co.

Check 2344 opposite last page.

Vapor absorber can be used for aeration and agitation of liquids, air cleaning of containers, and protection of desiccants for dehydration. Absorbers are summarized in Booklet — Selas Corporation of America.

Check 2345 opposite last page.

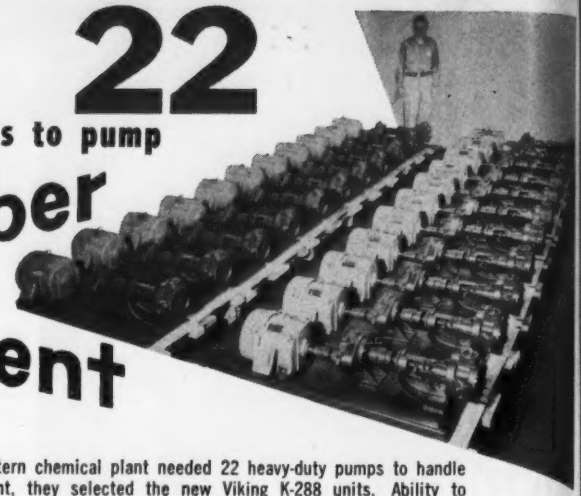
Bolts, nuts and studs of various materials with uniform Class 3 fit, are specified in Nuts and Bolts Bul — Pawtucket Manufacturing Company.

Check 2346 opposite last page.

CO_2 handling costs may be cut with use of patented direct-unloading system, in which CO_2 flows directly from insulated tank cars to process. System is considered in CO_2 Unloading System Bul—Chemicals Division, Olin Mathieson.

Check 2347 opposite last page.

22 Vikings to pump Rubber Cement



When an eastern chemical plant needed 22 heavy-duty pumps to handle rubber cement, they selected the new Viking K-288 units. Ability to handle viscous liquids under various conditions was of prime importance. Other major considerations were: quiet operation, cleanliness and simplicity in servicing. Compact, pressed steel bases also cut space and weight.

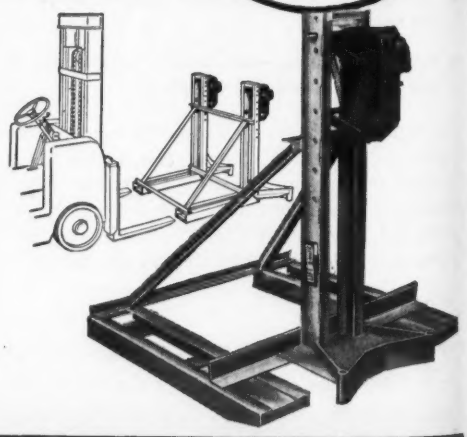
These K-288 pump units are suitable for many different pumping problems. Their five gear reducers are interchangeable and permit speeds ranging from 280 to 520 R.P.M. using 1750 R.P.M. motors, and 190 to 420 R.P.M. using 1200 R.P.M. motors. Capacities range from 17 to 164 G.P.M. Maximum pressure 200 P.S.I.

Check these pumps for your next pumping job. Ask for catalog : CCC pages 27-28.

VIKING PUMP COMPANY Cedar Falls, Iowa, U.S.A.
In Canada, it's "ROTO-KING" Pumps
See Our Catalog Insert in Chemical Engineering Catalog

Check 2348 opposite last page.

USE THE POWER TRUCK ATTACHMENT **LIFT-O-MATIC** for HANDLING DRUMS with a POWER FORK TRUCK WITH FORKS LEFT ON OR REMOVED



Simple, automatic, mechanical handling of any size or type of drum—single or multiple.

WRITE FOR CATALOG **MARVEL INDUSTRIES, Inc.**
2234 CLEVELAND ST., EVANSTON, ILLINOIS

Check 2349 opposite last page.

CURRENT LITERATURE

Plate magnets are considered in eight-page bulletin which includes graphs and specification tables. Bul 1074—Stearns Magnetic Products, Division of Indiana General Corporation.

Check 2350 opposite last page.

Wire cloth and screen, in variety of metals, meshes, weaves and wire sizes, is categorized in Condensed Screen Reference Cat.

(Condensed Screen Reference Cat is available from Ludlow-Saylor Wire Cloth Company.)

Check 2351 opposite last page.

(Condensed Screen Reference Cat is also available from Star Wire Screen & Iron Works.)

Check 2352 opposite last page.

Floor-patching material which sets immediately after use is delineated in Instant-Use Brochure—Flexrock Company.

Check 2353 opposite last page.

Lubricators force oil of any viscosity against high steam, gas and air pressure. Line is explained in Lubricator Cat—Manzel, a Unit of Houdaille Industries, Inc.

Check 2354 opposite last page.

Cryogenics applications of aluminum are expanded upon in Bul 11251—Aluminum Company of America.

Check 2355 opposite last page.

Tube expander is pictured in four-page Bul 64—Airetool Manufacturing Company.

Check 2356 opposite last page.

Aluminum brazing and welding is clarified respectively in Buls 19416 and 10415—Aluminum Company of America.

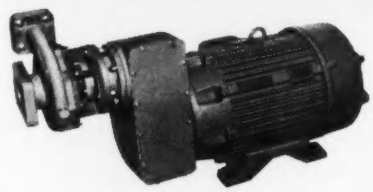
Check 2357 opposite last page.

"You're hired!"

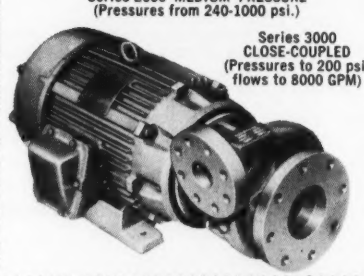
Petrochemical and Cryogenic TRANSFER PUMPS by Turbocraft

. . . for HIGH SPEED continuous or intermittent operation with very low suction requirements

more than 12 months service at Propulsion Field Laboratory 2500-3000 GMP on hundreds of tests



Series 2000 MEDIUM PRESSURE (Pressures from 240-1000 psi.)



Series 3000 CLOSE-COUPLED (Pressures to 200 psi, flows to 8000 GPM)

Increasing requirements for propulsion systems made it necessary for Rocketdyne, a division of North American Aviation, Inc., to expand testing facilities at its Propulsion Field Laboratory in the Santa Susana Mountains. Turbocraft, Inc., was selected to supply transfer pumps for LOX, LN_2, and other cryogenic service at the static test stands and component test laboratories.

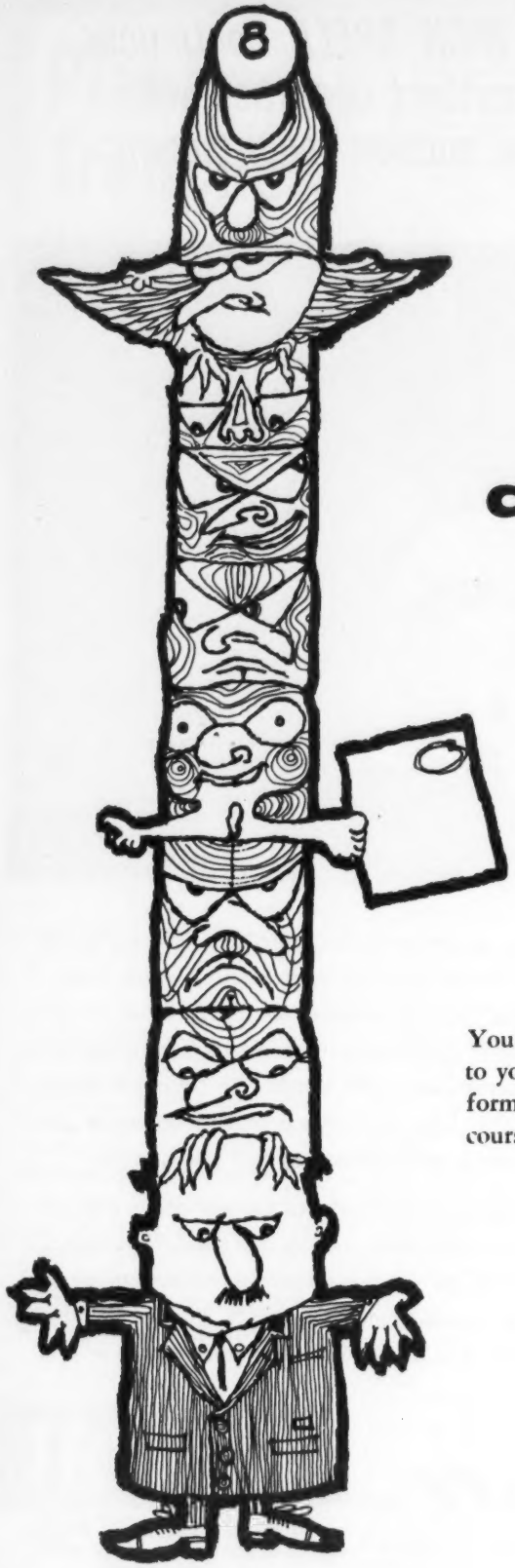
With a long record of successful applications in difficult service, Turbocraft is able to select just the right standard or special pump for your chemical processing, cryogenic or petroleum needs. You can specify Turbocraft with every confidence that your long-life requirements will be easily met.

Turbocraft INCORPORATED

492 EAST UNION STREET • PASADENA, CALIFORNIA • MURRAY 1-5253

Manufacturers of high-temperature liquid metal pumps / high-speed compressors / high pressure pumps / turboexpanders

Check 2358 opposite last page.



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CURRENT LITERATURE

Teflon filament packings w... are made of braided yarn fo... types of chemical-processing eq... ment, are itemized in Teflon F... ment Packing Bul—Packing D... vision, Raybestos-Manhattan, ...

Check 2359 opposite last pa...

Wire cloth of various types is in... ventoried in Bul 160—The Cle... land Wire Cloth & Mfg. Co.

Check 2360 opposite last pa...

Wet-weather clothing of PVC fa... tures seams stitched with ... thetic thread then shielded ... electronically welded. Clothing i... tabulated in PVC Clothing Bul— Jomac Inc.

Check 2361 opposite last page.

Handy engineering-data tables ar... contained in eight-page pamphlet, which includes information o... weights and specific gravities, en... gineering constants, steam coils i... storage tanks, short-cut engineer... ing conversion factors, steam tables, ampere ratings for induc... tion motors, and torque and hp equivalents, among others. Eng... neering Reference Pamphlet—The Falcon Manufacturing Division, First Machinery Corp., Inc.

Check 2362 opposite last page.

Valves

Relief-valve manifolds, liquid-oxy... gen relief valves, high-pressure ga... regulators, and high-pressure cyl... inder manifolds are considered in bulletins of same name — The Bastian-Blessing Company.

Check 2363 opposite last page.

Valved couplings instantly shut-off flow when disconnected to prevent run-out from overhead lines. Couplings are detailed in Cat 59 —Snap-Tite.

Check 2364 opposite last page.

Butterfly valves of resilient-seated type can be lined with any elastomer from natural rubber to Viton. They are detailed in Bul 590X— W. S. Rockwell Company.

Check 2365 opposite last page.

Ram-type drain valves are designed so that, in closed position, piston or ram extends up into tank. This is intended to prevent outlet plugging. Valves are considered in Drain Valve Cat— Strahman Valves, Inc.

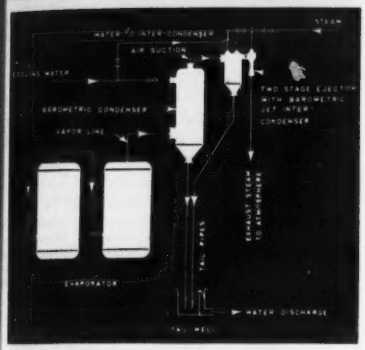
Check 2366 opposite last page.

Lubricated plug valves, available in variety of sizes, pressures and with special operating accessories, are delineated in Lubricated Plug Valve Bul—Rockwell Manufacturing Co.

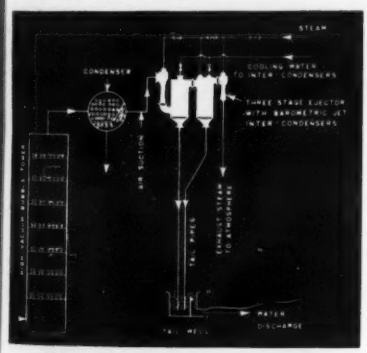
Check 2367 opposite last page.

Here's how to get high vacuum at lower cost... from

C. H. WHEELER



In Evaporation, C.H. Wheeler Tubejet® Ejector works with Wheeler Barometric Condenser in flow diagram above to produce high vacuum. Initial cost of Ejector is low and installation is easy because of light weight and simple connections.



In Refining Operations, diagram above shows how to create high vacuum in bubble tower. Three-stage Tubejet Ejector draws off exceptionally large volumes of gases, vapors. Absence of moving parts and use of corrosion-resistant materials (stainless steel, bronze, cast iron) result in very low maintenance costs. Many Tubejets, in fact, have operated more than 35 years without major replacement of parts!

FREE! 35-page catalog showing flow diagrams for many efficient, money-saving vacuum operations. Ask for Catalog 1462.

Process Equipment Division

C. H. WHEELER MFG. CO.

19th and Lehigh Avenue • Philadelphia 32, Pa.

Steam Jet Vacuum Equipment • Centrifugal, Axial and Mixed Flow Pumps
Steam Condensers • Marine Auxiliary Machinery • Nuclear System Components

Check 2368 opposite last page.

CURRENT LITERATURE

Globe and angle valves are reviewed in four-page Bul L-475 — The Bastian-Blessing Company.

Check 2369 opposite last page.

Automatic control valves, including float, pressure-reducing and back-pressure models, are presented in Control Valve Data—Klipfel Valves Incorporated, Division of The Hamilton-Thomas Corporation.

Check 2370 opposite last page.

Cast-steel valves for hydrogen and similar gases are considered in Cast-steel Valve Cat—Orbit Valve Company.

Check 2371 opposite last page.

Motors and Drives

Drives of positive-infinitely variable type which are chain-driven are detailed in Books 2274 (basic), 2349 (automatic controls) and 2774 (integral differential)—Link-Belt Company.

Check 2372 opposite last page.

Belt drives of multiple-V type can reduce sheave diameters 30 to 50%. They are summarized in V-belt Drive Design Bul—The Gates Rubber Company.

Check 2373 opposite last page.

Shaft couplings of flexible-cushion type have capacities to 825 hp at 1200 rpm. Couplings are clarified in Para•Flex Couplings Bul—Dodge Manufacturing Corporation.

Check 2374 opposite last page.

Reducing drives are topic of Line-O-Power Manual LP-3—Foote Bros. Gear and Machine Corporation.

Check 2375 opposite last page.

Synchronous motor starters for all low voltages and for 2200 to 4800 v power systems are reviewed in Buls 8200 and 8820—EC&M Division, Square D Company.

Check 2376 opposite last page.

Process Instrumentation

Pressure transmitter of flush-diaphragm type is specified in Buls A-713 and A-718 — Swartwout Division, Crane Co.

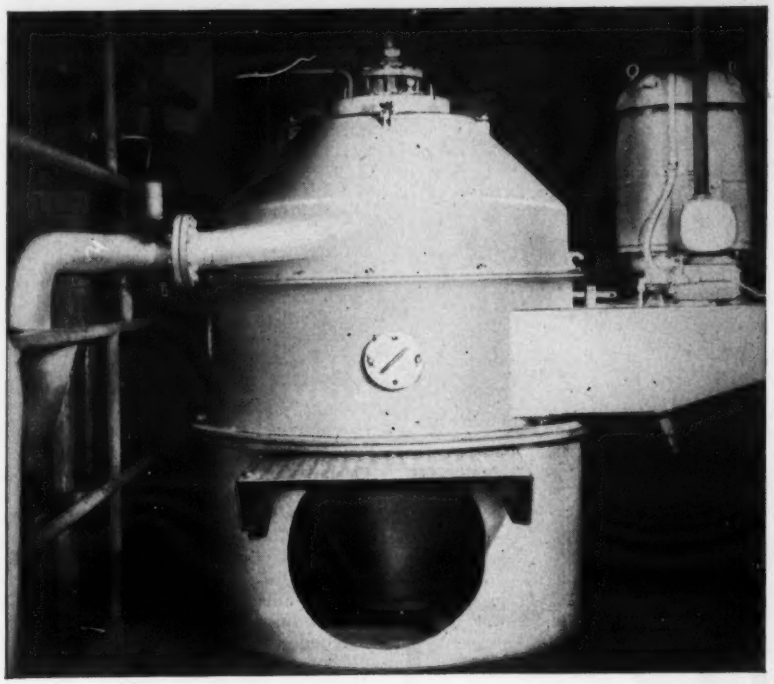
Check 2377 opposite last page.

Low-pressure (instrument air) and low-pressure diaphragm controls are both depicted in Cat 860—The Mercoid Corporation.

Check 2378 opposite last page.

Western Condensing Company gets Dry, Clean Lactose Crystals at Lower Processing Cost with the

MERCONE SCREENING CENTRIFUGE



A Mercone screening centrifuge is giving Western Condensing Company of Appleton, Wisc., more efficient separation of lactose crystals from cheese whey. Here's why:

Improved Product—Lactose crystals discharged from the Mercone are exceptionally clean and dry. The high quality of the separated product reduces the amount of refining chemicals required.

Maximum Recovery of Crystals—A DorrClone liquid cyclone used with the Mercone unit separates out fine crystals, recycles them through the Mercone. This Mercone-DorrClone combination gives maximum recovery of lactose.

Lower Operating and Maintenance Costs—The Mercone screening centrifuge occupies half the floor area of previous separation machinery, and has considerably greater capacity. Western Condensing's maintenance costs for the Mercone are less than those for the previous installation.

A compact, completely enclosed sanitary unit, the Mercone screening centrifuge is particularly well adapted to food processing. For information, just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

Mercone and DorrClone are Trademarks of Dorr-Oliver Inc., Reg. U.S. Pat. Off.

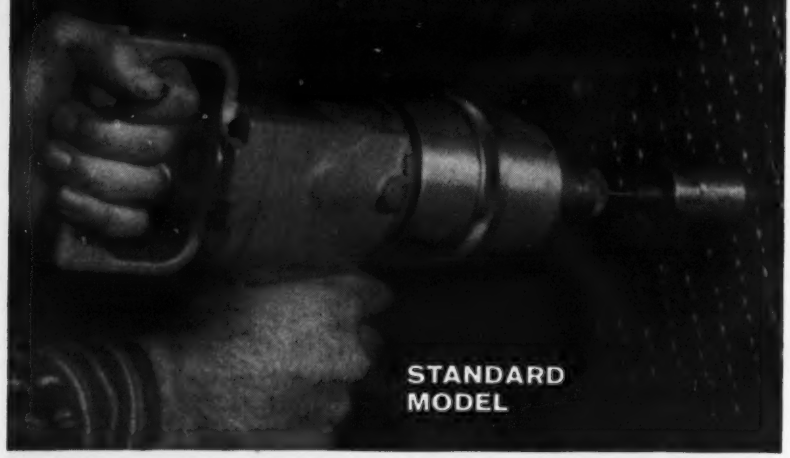
DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

Check 2379 opposite last page.

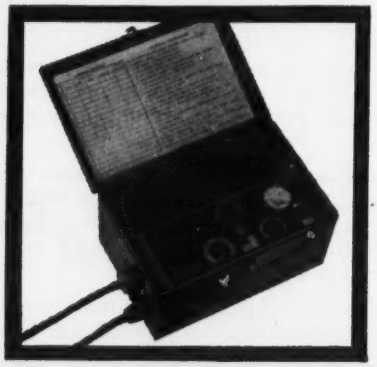
ELLIOTT air magnetic tube expander drives

automatically controlled for fast, accurate tube rolling



Designed for faster, precision tube rolling, the standard model Elliott Air-Magnetic drive is setting new records for speed and accuracy. Some operators average 12 tubes per minute. Desired torque easily preset by rotating forward end of unit. No tools needed. Rolling stops when preset torque levels are reached. Includes trigger-controlled, explosion-proof air motor in single unit. Magnetic control, no springs. Balanced for easy handling. For tubes ¼ in. through 3 in. *Standard model* handles most jobs. *Heavy-duty* for higher torque.

ALSO Electric Control ... Tube Expanders ... and Related Accessories



Elliott offers the Automatic Electric Control—an accurate torque-limiting device designed for tube expanding with any standard tapping motor. Also, a complete line of tube expanders, with rotating, parallel, self-feeding rolls. Available in 4 sizes, ranging from ¼ in. to 3½ in. O.D.

Other related accessories include Elliott tube gage, tube plugs, tube pilot, and tube rolling lubricant.

Write for descriptive literature *today*.

Y8-3

ELLIOTT Company
LAGONDA PLANT, Springfield, Ohio

Check 2380 opposite last page.

CURRENT LITERATURE

Temperature-control systems components are reviewed in Temperature-control Systems Information —Thermo Electric Co., Inc.

Check 2381 opposite last page.

Recording charts are available from stock in over 15,000 different types. They are subject of GC Stock List—Technical Sales Corporation, Subsidiary of Graphic Controls Corporation.

Check 2382 opposite last page.

Process instrumentation is considered in Process Instrumentation Bul—Taylor Instrument Companies.

Check 2383 opposite last page.

Process instrumentation of various types is covered in six bulletins. "Standardized Process Instruments," Temperature-pressure Bul, Bellows Flowmeter Bul, Miniature Instruments Bul, 53P Pneumatic Controller Bul and DP Transmitter Bul—Fischer & Porter Company.

Check 2384 opposite last page.

Corrosion Control

Pumps and valves for corrosive service are considered in seven bulletins. All-Chem® and Minilab® Buls (rotary pumps) and Gearchem® (gear pumps), Centri-Chem® (centrifugal pumps), Pumpmobile® (mobile pump units), Gear-Vac® (valves), and Chem-Cock® (safetydrain valves) Buls—Eco Engineering Company.

Check 2385 opposite last page.

Corrosion-resistant fittings, available in aluminum, titanium, zirconium, Hastelloy and other special alloys are treated in Fittings Cat—Horace T. Potts Company.

Check 2386 opposite last page.

Pumps, which are available in various corrosion-resistant materials, are summarized in Bul 725.4 —Goulds Pumps.

Check 2387 opposite last page.

Neoprene-asphaltic coating for resistance to weathering, moisture and mild chemical service is summarized in Gacote Na-62 Bul—Gates Engineering Company.

Check 2388 opposite last page.

Corrosion-resistant lattice-braid Teflon packings (131); mechanical seals (164); Teflon-jacketed gaskets (154); and solid-Teflon and Teflon-lined expansion joints (137); are specified in Cats AD-131, AD-164, AD-154, and AD-137—The Garlock Packing Co.

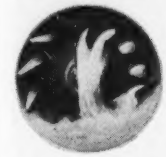
Check 2389 opposite last page.

Highly Intimate Blends in 1 to 2 Minutes

Blends while discharging; No segregation or flotation

Sturtevant Rotary Blenders start 4-way blending while charging, continue it during discharge, thus producing highly intimate even blends of dry and semi-dry materials – within 3 to 5 minutes of start of charging.

Six *complete* blending cycles per hour are common. And Sturtevant's special action produces no particle reduction, cleavage or attritional heat – is highly effective yet gentle and safe even with explosives.



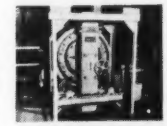
Receiving
Scoops cascade material as drum rotates. Movement forces material from both ends to middle. Thus blending is 4-way right from start of charging.

Discharging
Single gate controls charge, discharge. Blending continues throughout discharge phase. Result is no segregation or flotation — highly intimate, even blends.

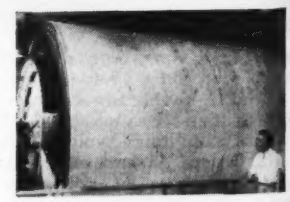
Self-cleaning, dust-sealed drum; one-man accessibility

Operation of Sturtevant Blenders is self-cleaning – drum interiors are completely dust-sealed. For inspection of all models one man simply loosens a few lugs to remove manhole cover – quickly and easily.

Nine standard models with capacities to 900 cu. ft.



10 cu. ft. Sturtevant Blender at U.S. Steel Corp.'s new Applied Research Laboratory (Raw Materials Division) in Monroeville, Pa. This unit handles batches up to 500 lbs. — is ideal for pilot work and small runs.



One of four 450 cu. ft. Sturtevant Blenders at Celriver Plant of Celanese Corp. (Rock Hill, N. C.). These large units handle up to 20,000 lbs. batches — have a 9-year record of meeting the most exacting blending requirements.

Fully or semi-automatic, or manually controlled operation

Constructed of carbon steel, stainless steel or Monel metal, Sturtevant Rotary Blenders are engineered to fit each customer's needs – can be supplied with injector sprays and any desired control system.

For more on Sturtevant Blenders, request Bulletin No. 080B. (Bulletins also available on Mixers, Air Separators, Micronizers, Crushers and Grinders.) Write today. STURTEVANT MILL CO., 119 Clayton St., Boston, Mass.

Check 2390 opposite last page.

Swivel joints of US type are designed so that fluid contacts metal and packing only. Thus wettable parts of corrosion-resistant alloys can handle all types of caustic products. Joints are subject of Swivel Joint Cat—Industrial Products Division, Continental-Emsco Company, Division of The Youngstown Sheet & Tube Company.

Check 2391 opposite last page.

Elastomer-lined centrifugal pumps, which can handle corrosive muriatic acid, HCl, bleaching agents and other destructive media, are available in linings of natural rubber, Neoprene and Hypalon. Pumps are inventoried in Bul P-6 —Ampco Metal, Inc.

Check 2392 opposite last page.

Vinyl-plastic tube for corrosive application is available in variety of formulations and over 65 standard sizes to 4" ID. Information on formulations and other specifications is tabulated in Bul T-100—U. S. Stoneware.

Check 2393 opposite last page.

Pressafiner is engineered specifically for expression of moisture or other fluids from various materials. Units, which incorporate stainless-steel construction to permit processing of corrosive or toxic materials, are specified in Pressafiner Bul—The Bauer Bros. Co.

Check 2394 opposite last page.

Stainless steel is used by Tranter Manufacturing, Inc., of Lansing, Michigan, for plate coil in applications such as that of maintaining constant temperature of 70 to 72°F in 16-2/3% sulfuric acid solution. This application is outlined in Tranter Platecoil Information —Stainless and Strip Division, Jones & Laughlin Steel Corporation.

Check 2395 opposite last page.

PVC pipe, fittings and valves for corrosion service are specified in Bul CE-56 — American Hard Rubber Company, Division of Amerace Corporation.

Check 2396 opposite last page.

Wire cloth for corrosive service, including space, mesh, bolting, filter and backing types, among others, are treated in Wire Cloth Bul—Newark Wire Cloth Company.

Check 2397 opposite last page.

Valves, of stainless (2156) for corrosive pulp stock, of high nickel-chrome stainless (2411) for sulfuric acid and of 200-lb bronze type (2285), are considered in Circular AD-2156 and Buls AD-2411 and AD-2285 — Crane Co.

Check 2398 opposite last page.

HIGHER Thermal Efficiencies . . . . . GREATER Savings In Industrial Process Heating!

THE HI-TURBIANT HEATER

If you have any process operations— large or small—where process fluids are heated, directly or indirectly, investigate now the substantially greater thermal efficiencies and lower operating costs the Hi-Turbiant Heater is bringing to other processing applications similar to yours.

As shown in the cutaway view, the Hi-Turbiant has both radiant and re-radiant heating zones—a unique advancement that insures more uniform heat absorption throughout the entire tubular network!

High fluid turbulence, maintained by high-temperature pumps, reduces boundary layer vaporization and assures substantially greater heat efficiencies without vaporization problems!

More uniform heating permits greater height-to-diameter ratio—therefore fewer "hairpins" in the tube system for more efficient fluid flow, lower pumping costs, greater operating economies!

Because of these and other unique Hi-Turbiant advancements, you make multiple savings in process heating applications— savings in size of unit required, savings in fuel costs, savings in pumping costs, savings in plant space. Send for illustrated bulletin that gives detailed data and shows typical systems. *Ask for Bulletin #HT-100!*

TWO BROAD FIELDS OF APPLICATION!

1. Heating Transfer Fluids (Dowtherm, Aroclor, Hydrocarbon oils, etc.) used in heat processing.
2. Direct Firing of process streams (Rich-Oil denuding, asphalt heating, etc.) where fluids must be heated under close thermal control.

In both types of application, the Hi-Turbiant Heater brings new standards of efficiency, new savings in processing costs!

COMPLETE RANGE OF SIZES—
½ TO 40 MILLION BTU/Hr.

Also, single user "package" units 200,000 to 1,500,000 BTU/Hr.

There's a Hi-Turbiant Heater to fit your requirements!

Z-122

COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
CMP Combination Units
DUALAIRE Jet-Cleaned Filters
THERM-O-FLEX Hi-Temp Filters
TURBULAIRE-DOYLE Scrubbers
HOLO-FLITE Processors
HI-TURBIANT Heaters

WESTERN
PRECIPITATION
DIVISION OF JOY MANUFACTURING COMPANY

Engineers and Constructors of Equipment for Collection of Suspended Material from Gases . . . and Equipment for the Process Industries

LOS ANGELES 54 • NEW YORK 17 • CHICAGO 2 • PITTSBURGH 22 • ATLANTA 5 • SAN FRANCISCO 4

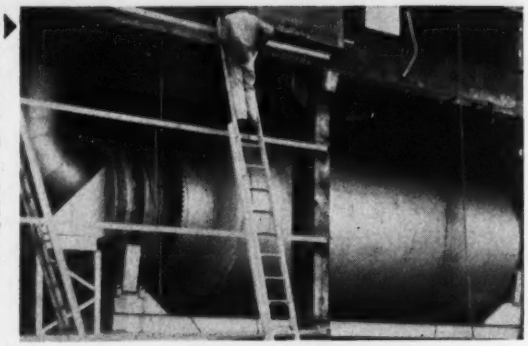
Representatives in all principal cities

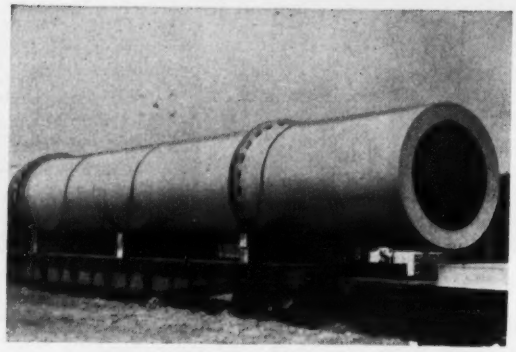
Precipitation Company of Canada Ltd., 8285 Mountain Sights Avenue, Montreal 9

Check 2399 opposite last page.

RENNEBURG
PROCESS EQUIPMENT
for the Chemical Industry

Renneburg DehydrO-Mat Cooler (Patented) — This countercurrent cooler features dustless operation, large capacity, compactness, and positive *controlled* unloading.





Renneburg 8′ dia. x 70′ Straight Shell Dryer — Other dryers and coolers available in a wide variety of sizes and capacities.

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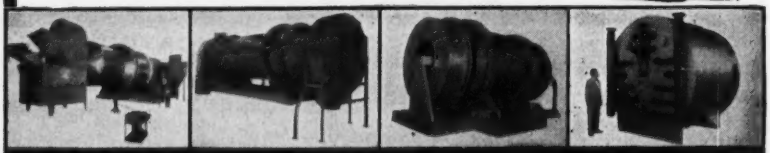

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Check 2400 opposite last page.

CURRENT LITERATURE

Pressure-sensitive tape of Teflon with fluoropolymer adhesive is good for applications where fuel or chemical resistance is necessary at temperatures to 400°F. Tape is considered in Temp-R-Tape® FR Folder — Connecticut Hard Rubber Co.

Check 2401 opposite last page.

Extruded teflon shapes are available for applications in fluid separators, feeding tubes for small parts, channels and seals. Shapes, for service in −450 to 500°F temperature range, are detailed in Extruded Teflon Shapes Bul—Pennsylvania Fluorocarbon Co., Inc.

Check 2402 opposite last page.

Pumps for corrosion resistance can be fabricated from zirconium and titanium. Corrosion-resistance values of these two metals are referenced in eight-page Zirconium-titanium Corrosion Table—Eco Engineering Company.

Check 2403 opposite last page.

Ductile-iron pipe's role in fighting corrosion is discussed in Ductile Iron Pipe Bul—James B. Clow & Sons, Inc.

Check 2404 opposite last page.

Gear pump of hard rubber with 12-gpm capacity has all wetted parts acid-resistant. Unit is presented in Bul CE-55 — American Hard Rubber Company, Division of Amerace Corporation.

Check 2405 opposite last page.

Pipe-sealer tape, which seals against corrosives in temperature range of −250 to +500°F, is treated in Thred-Tape Bul — Crane Packing Company.

Check 2406 opposite last page.

Metering corrosive fluids can be done with all-glass transmitting rotameter or model with halofluorocarbon metering tube. Two units are among those covered in eight-page bulletin describing more than a dozen available materials. Bul 150—Brooks Rotameter Company.

Check 2407 opposite last page.

Flexible poly pipe for water lines, drains, underground pipe or conduit, in sizes of ½ to 2″, is subject of Bul CE-57—American Hard Rubber Company, Division of Amerace Corporation.

Check 2408 opposite last page.

Corrosive or explosive fumes, under extreme heat or high humidity can be moved with belt-driven axial fans which have airfoil propellers cast of aluminum-magnesium alloy. They are expanded upon in Bul 620-CP—Propellair®, Division of Robbins & Myers, Inc.

Check 2409 opposite last page.

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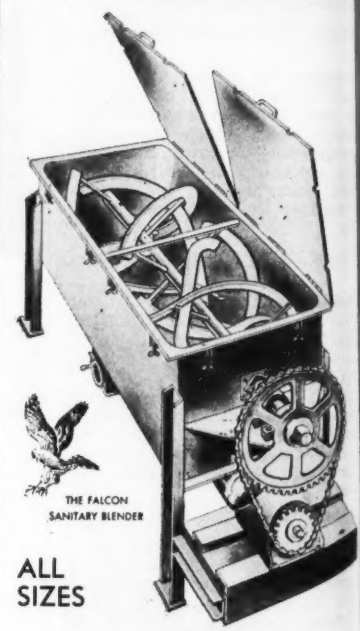

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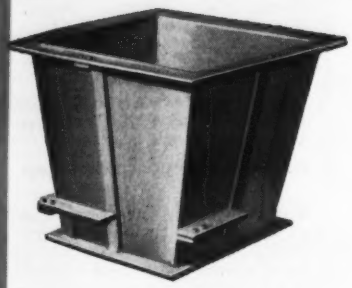
or accurate reproduction of ulk material formulations—W-C ATCH-WEIGHING SYSTEMS



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Check 2411 opposite last page.

CURRENT LITERATURE

Chemical Materials

Cationic starch carries cationic charge as integral part of polymeric structure, with result of strong affinity for negative surfaces. Product is specified in Cato® Bul—National Starch and Chemical Corporation.

Check 2412 opposite last page.

Butynediol's physical properties, storage and handling instructions and chemical reactions are tabulated in Butynediol Bul—Antara® Chemicals Division, General Aniline & Film Corporation.

Check 2413 opposite last page.

Bromine of high-purity elemental type is covered in Bromine Bul—The Dow Chemical Company.

Check 2414 opposite last page.

Primary amyl alcohol's physical properties, shipping data and uses are incorporated in Amyl Alcohol Bul—Union Carbide Chemicals Company, Division of Union Carbide Corporation.

Check 2415 opposite last page.

Recovering spent sulfuric acid is topic of discussion in Sulfuric-acid Recovery Bul—General Chemical Division, Allied Chemical Corporation.

Check 2416 opposite last page.

Chlorinating agents, sulfur monochloride, sodium benzoate and carbonate of potash are subjects of "Hooker Chlorinating Agents" and Sulfur Monochloride, Sodium Benzoate and Carbonate of Potash Data Sheets — Hooker Chemical Corporation.

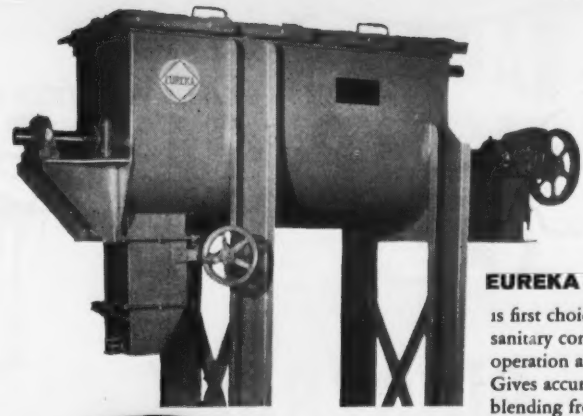
Check 2417 opposite last page.

Maleic anhydride, isophthalic, terephthalic acid and phthalic anhydride are specified in four bulletins—Oronite Chemical Company.

Check 2418 opposite last page.

Phosphates and epoxies are specified in 10 bulletins. Lindol (tricresyl phosphate, low color), Celluflex 179A (tricresyl phosphate, low specific gravity), Celluflex 179C (tricresyl phosphate, general purpose grade), Celluflex 179EG (tricresyl phosphate, electrical grade), Celluphos 4 (tributyl phosphate), Celluflex TPP (triphenyl phosphate), Celluflex 112 (cresyl diphenyl phosphate), Celluflex CEF (tris beta-chloroethyl phosphate), Celluflex FR-2 (tris dichloropropyl phosphate), and Celluflex 23 (alkyl epoxy-stearate)Buls—Celanese Chemical Company, Division of Celanese Corporation of America.

Check 2419 opposite last page.



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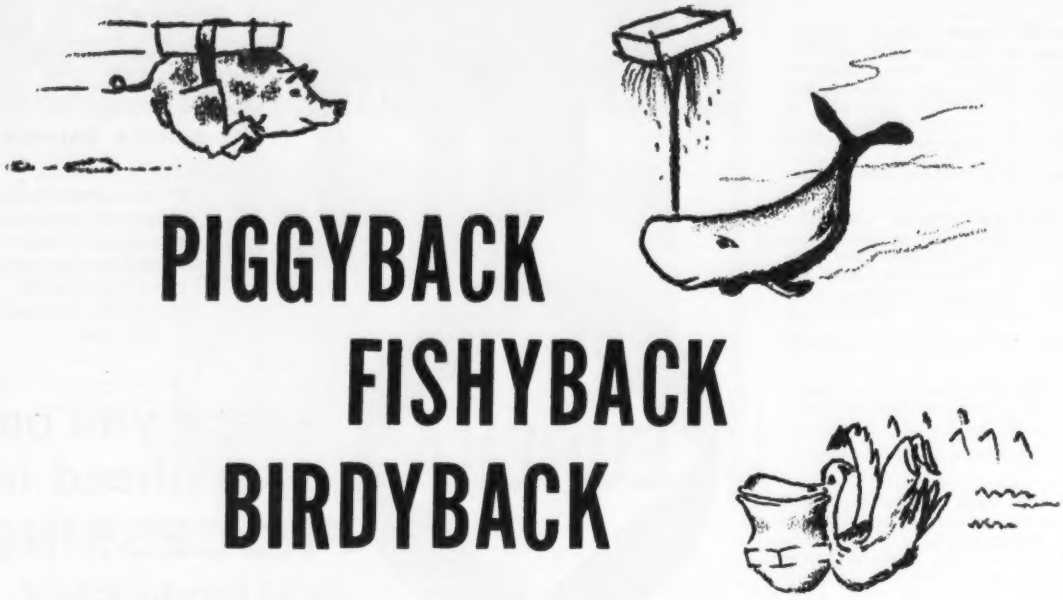

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The Chemical Processing Industries are finding new ways every day to trim freight budgets that often are as high as 25% of sales. Containerization schemes to capitalize on the best features of rail, highway, water and air movement promise to melt the fat from transportation budgets.

Flip back to page 28 for an up-to-the-minute report on what these fast-breaking developments are accomplishing . . . and an analysis of what they hold in store for you.

The report is a highlight of CP's third annual Feature on Material Handling, Packaging & Shipping . . . bringing you reports on cost-cutting plant procedures, new equipment and package developments, capsule reviews of pertinent literature. (Index to Feature Highlights is on page 27.)

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CURRENT LITERATURE

2-Nitropropane is topic of seven publications. Tech Data Sheet 23B ("High Solids Vinyl Formulations with Nitroparaffins") and Tech Buls 4 ("Roller Coat Vinyl Formulations Made with 2-Nitropropane"), 6 ("Nitroparaffins As Solvents For Vinylite VYNS-3"), 7 ("Cut Costs of Vinyl Solutions with 2-Nitropropane"), 10 ("2-Nitropropane As A Solvent in VAGH Vinyl Coatings"), 11 ("The Nitroparaffins and Their Uses In Coatings"), and 23C ("Formulation of Epoxy Resin Finishes with 2-Nitropropane")—Industrial Chemicals Department, Commercial Solvents Corporation.

Check 2421 opposite last page.

Silicone defoaming is topic of Silicone Defoamer Bul—Dow Corning Corporation.

Check 2422 opposite last page.

Polypropylene is used in variety of applications such as rope, automobile seat covers, household appliances and variety of industrial uses. Details are incorporated in Pro-fax® Bul—Hercules Powder Company.

Check 2423 opposite last page.

Methyl ethyl ketone peroxides—one 60% perperoxide in dimethyl phthalate and one 60% peroxide in dimethyl phthalate—are subject of Lupersol® Data Sheet—Lucidol Division, Wallace & Tiernan Incorporated.

Check 2424 opposite last page.

Material Handling

Semi-bulk handling of materials such as chalk, clay, cement, whiting and PVC is possible with Invert-a-bin Units. They can be rotated or tumbled in sling-type, floor-type or lift-truck grab attachments just prior to discharge. Aeration and vibration attachments are on discharge cone. Unit is subject of Invert-a-bin Bul—The Powell Pressed Steel Company.

Check 2425 opposite last page.

Vertical screw conveyors have capacities to 6000 cu ft/hr and are available in eight basic types and four diameters. Units are expanded upon in Rotor Lift Engineering Cat—Southwestern Supply and Machine Works.

Check 2426 opposite last page.

Batch-weighing systems are built around force-balance unit capable of accuracy of ± 0.25% calibrated weight range, with reproducibility better than 1 part in 2000. Systems are treated in Bul 14—Weighing & Control Components, Inc., Division of CompuDyne Corp.

Check 2427 opposite last page.

how to give yourself the air

Some raw materials are dirt-cheap—or even air-cheap. It's a steal when you can pump in a raft of outside air and ship nitric oxide or nitric acid out the back door. Maybe you want something less lethal from your oxidation-reduction process but whatever it is, activated charcoal when used as a catalyst does the job over and over again—and at low cost, too.

how to find a silver lining

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Check 2428 opposite last page.

CURRENT LITERATURE

Bulk-storage system incorporates glassed-steel storage structures with mechanical sweep-arm bottom unloaders. These are treated in Bul MU-100—A. O. Smith Corporation.

Check 2429 opposite last page.

Vibrating conveyor can be combined with one or more screening, washing or drying operations with units which are summarized in Vibrating Conveyor Cat—Ajax Flexible Coupling Co. Inc.

Check 2430 opposite last page.

Scales, in which weights are printed in full figures on 8-½ x 11" forms, tickets or strips, are presented in Bul 2017—Toledo Scale, Division of Toledo Scale Corporation.

Check 2431 opposite last page.

Pneumatic-conveying systems are delineated in four-page bulletin which outlines typical materials conveyed and describes principles involved. Bul 315—Robinson Air-Activated Conveyor Systems, Division of Morse Boulger Destructor Company.

Check 2432 opposite last page.

Belt conveyors or pre-built sectional type eliminate need for detailed drawings. Line has interchangeable standardized parts. Conveyors are clarified in 40-page Cat 2779—Link-Belt Company.

Check 2433 opposite last page.

Transporter stacker attachments can add job flexibility to basic units. Items such as hydraulic scoop, utility clamping device, mechanical gravity drum dumper, remote-control mast, gooseneck crane attachment, revolving paper-roll clamp, hydraulic drum handler and cable reel handler are touched upon in "Transporter Facts and Factors"—Automatic Transportation Company, Division of Yale & Towne Manufacturing Company.

Check 2434 opposite last page.

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ADVERTISERS in this issue

A

Abbé Inc., Paul O. 188
Aeroquip Corporation 96
Air-Maze Corporation, The 154
Air Preheater Corporation, The 160
Ajax Flexible Coupling Co., Inc. 48
Allen-Sherman-Hoff Company, The 46
Allied Chemical Corp., Baker & Adamson, General Chemical Division 2nd Cover
Allied Chemical Corp., General Chemical Division 65
Allis-Chalmers 174
Allis-Chalmers, Engine-Material Handling Division 47
Alloy Products Corp. 113
Alloy Steel Products Company 110
Alpha-Molykote Corp., The 80
Aluminum Company of America 44-45
Amercoat Corporation ..... 4th Cover
American Brass Company, The 130
American Chain & Cable Company, Inc., Helicoid Gage Division 209
American Hard Rubber Company, Division of Amerace Corporation 108
American Meter Company, Pump Division 124
American-Standard Industrial Division 163
American Sterilizer 141
Ampco Metal, Inc. 16
Annin Company, The 53
Appleton Electric Co. 183
Armstrong Machine Works 161
Automatic Transportation Company, Division of the Yale & Towne Manufacturing Company 50

B

B-I-F Industries, Inc. 145
Babcock & Wilcox Company, The, Tubular Products Division 125
Bacharach Industrial Instrument Co. 146
Baker & Adamson, General Chemical Division, Allied Chemical Corporation ..... 2nd Cover
Barnebey-Cheney 200
Bauer Bros. Co., The 90
Bean Division, John, Food Machinery & Chemical Corp. 190
Bennett Industries, Inc. 191
Binks Manufacturing Company 196
Blackmer Pump Company 210
Brabender Instruments, Inc., C. W. 146
Bristol Company, The 177
Brooks Rotameter Company 148
Bucket Elevator Co., The 4
Butler Manufacturing Company 90

C

Cambridge Instrument Co., Inc. 146
Cambridge Wire Cloth Co., The 148
Cardox Division of Chemetron Corporation 70
Ceilcote Company, Incorporated, The 212
Celanese Chemical Company, A Division of Celanese Corporation of America 79-79
Celluplastic Corporation 17
Chemical Construction Corporation, Gas Scrubber Division 91
Chemical & Power Products, Inc. 149
Chempump Division, Fostoria Corporation 181
Chiksan Company, A Subsidiary of Food Machinery and Chemical Corporation 88-89
Cleveland Vibrator Company, The 176
Cleveland Wire Cloth & Mfg. Co., The 89
Combustion Engineering, Inc., Raymond Division 197
Continental Can Company 50A
Conveyors & Dumpers, Inc., Division of Mercury Industries, Inc. 59

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Coppus Engineering Corporation 95
Crane Co., Industrial Products Corp. .. 103
Crane Packing Company 6
Croll-Reynolds Co., Inc. 169
Culligan 170

D

Daffin Manufacturing Company, Industrial Division 150
Darling Valve & Manufacturing Co. 209
Davenport Machine and Foundry Company 124
Dawe's Laboratories, Inc. 84
Dietert Co., Harry W. 139
Dorr-Oliver, Incorporated 199
Dow Chemical Company, The 71
Dow Corning Corporation 151

E

Eco Engineering Company 19
Electric Steel Foundry Company 98A-B
Elgin Softener Corporation 76
Elliott Company, Lagonda Plant 200
Essex Conveyors, Inc. 36
Exact Weight Scale Company, The 59

F

Fairbanks, Morse & Company 148
Falcon Manufacturing, The, Div. of The First Machinery Corporation 202
Falk Corporation, The 98
Fibercast Company, A Division of Youngstown Sheet & Tube Company 178-179
Fisher Governor Company 133
Flexrock Company 210
Fluid Energy Processing & Equipment Company 155
Foote Bros. Gear and Machine Corporation 207
Foremost Food and Chemical Company, Eldorado Division 66
Foxboro Company, The 132, 187
Fruehauf Trailer Company 173
Fuller Company, Subsidiary of General American Transportation Corporation 50B

G

Gabb Special Products, Inc. 152
Garden City Fan & Blower Co. 190
General American Transportation, Airslide & Dry-Flo Car Division 32
General American Transportation Corporation, Process Equipment Division, Louisville Dryers 177
General American Transportation Corporation Process Equipment Division, Turbo-Mixers ..... 3rd Cover
General Chemical Division, Allied Chemical Corporation 65
Girdler Process Equipment Division, Chemetron Corporation 68
Glas-Col Apparatus Co., Inc. 143
Glascote Products, Inc. A Division of A. O. Smith Corporation 56-57
Goodall Rubber Company 115
Goodrich Chemical Company, B. F. 20
Goslin-Birmingham Manufacturing Co., Inc. 184

H

Hapman Corporation, Conveyor Division 60
Harrington & King Perforating Co., Inc., The 154
Harrisburg Steel Co., Division of Harsco Corporation 25
Harshaw Chemical Co., The 67
Helicoid Gage Division, American Chain & Cable Company, Inc. 209
Hercules Powder Company 74
Hetherington & Berner Inc. 124

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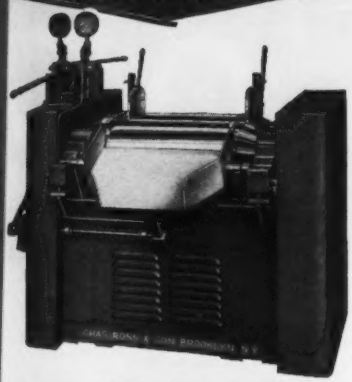

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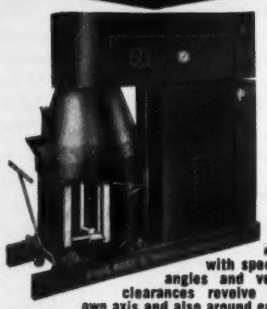
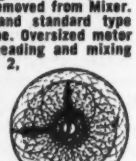


• Stirrers with special blade angles and very close clearances revolve on their own axis and also around can, developing 12 intense compressive and shearing actions with each revolution to break down and disperse agglomerates.

• Variable speed for infinite range of stirrer speed control. • Simplified vertical hydraulic lift for greatest ease in cleaning down stirrers. • Non-revolving can is completely enclosed during mixing for safety and to reduce solvent loss. Cans can be jacketed or fitted with slide gate when required. Cans are easily positioned or removed from Mixer. • Extra heavy construction and standard type motor eliminate costly downtime. Oversized motor drives can be provided for kneading and mixing extremely heavy materials. 1, 2, 3, 4, 6, 8, 12, 25, 50, 65, 85, 125 and 150 gallon sizes.



Area of can contacted by stirrers during only one revolution of stirrers around can (2 seconds). Position of stirrers advances 4½" with each successive revolution to sweep entire area and all points on sides of can. Stirrers overlap each other as well as center of can.

Write for further information!

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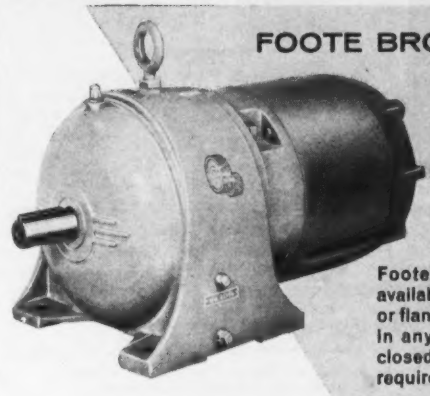
Brooklyn 5, N. Y., U. S. A.

Check 2436 opposite last page.

FOOTE BROS. Motorized Drives

Duti-Rated LIFETIME GEARING

Gives You More Power Per Dollar

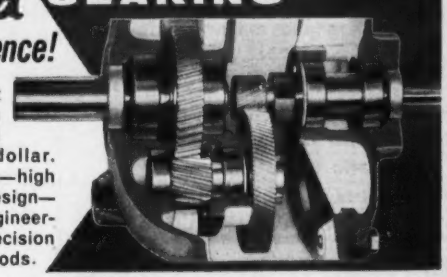


FOOTE BROS.-LOUIS ALLIS GEARMOTORS

1 to 150 HP...Single, Double, Triple, Quadruple Reductions . . . Output Speeds from 780 to 7.5 RPM

Foote Bros.-Louis-Allis Gearmotors are available in over 3500 types and sizes. Foot or flange mountings. Motors can be ordered in any type—open drip-proof, totally enclosed, explosion proof, etc. to meet your requirements.

Duti-Rated GEARING Makes the Difference!



Duti-Rated Gearing is the heart of Foote Bros. Motorized Drives . . . drives that give you more load capacity and wear life per dollar. This is premium quality gearing—high hardness, accurate, balanced design—the product of thousands of engineering and development hours, precision tooling and manufacturing methods.

FOOTE BROS. Line-O-Motor

1 to 75 HP...Double, Triple Reductions... Ratios: 5:1 thru 238:1

Line-O-Motor Drives accept any NEMA frame motor . . . permit you to use your own motor or specify type to meet plant standardization. Foot or flange mounted.

Write for CATALOG MRA. It has complete details and selection data on Foote Bros. Motorized Drives.

FOOTE BROS. FB GEAR AND MACHINE CORPORATION
4553 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

Check 2437 opposite last page.

Heyl & Patterson, Inc. 62-63
Highside Chemicals Incorporated 84
Hilliard Corporation, The 208
Homestead Valve Manufacturing Company 97
Hooker Chemical Corporation 69
Hough Co., The Frank G., Subsidiary — International Harvester Company 55
Howes Co., Inc., S. 203
Hudson Engineering Corporation 171
Hydromatics, Inc. 14A-D

I

Illinois Water Treatment Co. 192
Industrial Filter & Pump Mfg. Co. 75
Irving Subway Grating Co., Inc. 196

J

Jamesbury Corporation 10
Jenkins Bros. 5
Johnson Corporation, The 154
Jones & Laughlin Steel Corporation, Stainless and Strip Division 13

K

Keflex Manufacturing Division of U. S. Flexible Metallic Tubing Co. 102
Kellogg Company, The M. W., A Subsidiary of Pullman Incorporated 11
Kin Tel, A Division of Cohu Electronics, Inc. 15
Klipfel Valves Incorporated 155
Knox Porcelain Corporation 85

L

LaBour Company, Inc., The 127
Lammert & Mann Co., Inc. 144
Lamports Company, The 210
Lapp Insulator Co., Inc. 113
Lee Metal Products Company, Inc. 12
Lift Trucks Incorporated 36
Link-Belt Company 42
Lonergan Company, J. E. 180
Louisville Dryers, General American Transportation Corporation, Process Equipment Division 177
Lucidol Division, Wallace & Tiernan Incorporated 84
Lumenite Electronic Co. 144
Lunkenheimer Company, The 8

M

Manning, Maxwell & Moore, Inc. 106, 128
Manton Gaulin Manufacturing Co., Inc. 164
Manzel, A Unit of Houdaille Industries, Inc. 170
Marsh Instrument Co., Division of Colorado Oil and Gas Corporation 90
Martin Engineering Company 210
Marvel Industries, Inc. 196
Mason-Neilan, Division of Worthington Corporation 100-101
Mathieson Chemicals 40
Mechanical Products Corporation 102
Metals Disintegrating Company, Inc. 7
Midland Industrial Finishes Co. 114
Milton Roy Company 107, 193
Minnesota Mining and Manufacturing Company 3
Molded Fiber Glass Tray Co. 191
Multi-Metal Wire Cloth Co., Inc. 80

N

Nalco Chemical Company 72
National Air Vibrator Co. 182
National Airoil Burner Co., Inc. 81

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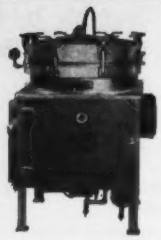

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For complete oil reclaiming. Removes solids, acids and volatile impurities; moisture, solvents, gases, etc. by heat-vacuum process.

A simple, economical and efficient method of restoring contaminated lubricating and sealing oil to the full value of NEW OIL. The HILCO will produce and maintain oil free of solids, water, gums and acids in a continuous, all-electric, automatic operation.

Be Sure of CLEAN OIL in your HIGH VACUUM PUMPS

KEEP YOUR HYDRAULIC SYSTEM *Clean* with

HILCO HYDRAULIC OIL FILTER

No More Varnish and Sludge Deposits
No More Flushing and Manual Cleaning
No More Frequent Oil Changes
No More Accumulation of Dirt
Filter life up to a year eliminates usual frequent draining, refilling of systems.

Write for complete details in the free bulletin at no obligation . . .

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In Canada
UPTON-BRADEN-JAMES LTD.

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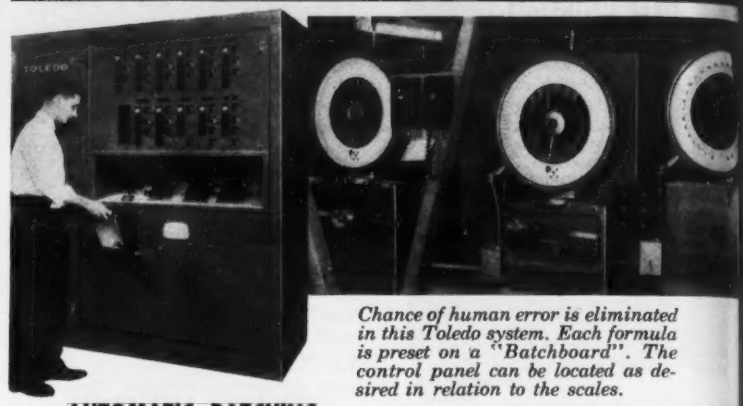
TOLEDO Reports on Automatic Weighing

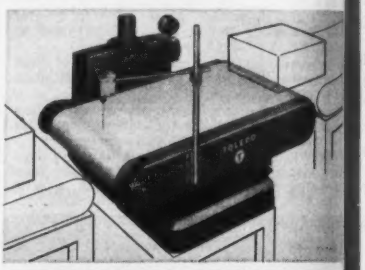
★ *NEW IDEAS FOR COST-SAVING*



Chance of human error is eliminated in this Toledo system. Each formula is preset on a "Batchboard". The control panel can be located as desired in relation to the scales.

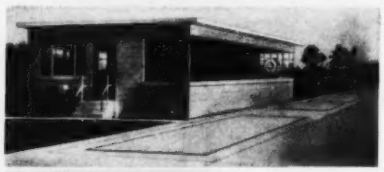
AUTOMATIC BATCHING

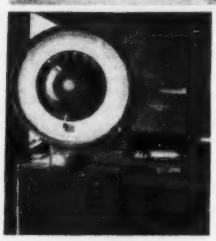
Operator at convenient remote location has full command of a multiple scale batching system with Toledo Remocon. As many formulas as required are pre-set on "Batchboards" and inserted into panel. This is one of several types of Toledo remote-control batching systems for today's needs, including punch card, "Formulaplug" and digital scanner. Ask for Bulletin 2964.



CHECKWEIGHS IN-MOTION

Many plants today are putting Toledo Automatic Checkweighers into their conveyor lines. Models to provide continuous, 100% in-line checkweighing of items from a few ounces to 200 pounds. Motorized belt. Handle sacks, cartons, packages, pieces, parts. Ask for Bulletin 2968.

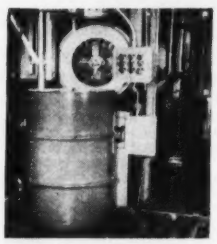




LOAD CELL DIAL DOES TRIPLE DUTY

. . . ALSO PRINTWEIGH RECORDING

One remote dial serves *three* platforms in this Toledo Electronic Load Cell Scale for truck weighing at a large cement plant. With a truck on three platforms, scale reads individual axle loads or total weight. Equipped with Printweigh "400" to print full figure weight data. Brings new versatility to weighing. Request Bulletin 2970.



AUTOMATES DRUM-FILLING

In this oil industry plant, a Toledo sub-surface filler automatically eliminates foaming and controls drum filling. The scale is keyed into conveyorized system . . . provides faster, more accurate filling. Saves time, labor, avoids loss of material and customer goodwill. One of many operations where Toledo controls guard costs. Ask for Bulletin 9030.

WRITE TODAY for specialized help from our Custom Products Division, or contact the Toledo Office near you, to solve your problems in batching, checkweighing, drum-filling, load cell applications. TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.

(Toledo Scale Co. of Canada, Ltd., Windsor, Ont.)

SERVICE Factory-Trained 240 Cities

TOLEDO®

Headquarters for Weighing Systems

Check 2448 opposite last page.

National Conveyor & Supply Company 60
National Distillers and Chemical Corporation, U.S. Industrial Chemicals Co. Division 74A-B
National Drying Machinery Company, The 159
National Engineering Company, Simpson Mix-Muller Division 167
National Filter Media Corporation, The 24
National Forge Company 157
National Oats Company, Dura Buket Division 114
Neptune Meter Company 140
Niagara Blower Company 168

O

Olin Mathieson, Chemicals Division 40
Orr & Sembower, Inc. 73

P

Palmer-Shile Co. 54
Palmer Thermometers, Inc. 140
Parks-Cramer Company 195
Peerless Pump, Hydrodynamics Division, Food Machinery and Chemical Corporation 118-119
Pennsylvania Fluorocarbon Co., Inc. 112
Pittsburgh Lectrodryer Division, McGraw-Edison Company 189
Powell Company, The Wm. 18
Powell Pressed Steel Company, The 49
Prater Pulverizer Company 194
Pressure Products Industries, Inc. 164
Propellair, Div. of Robbins & Myers, Inc. 146
Pulverizing Machinery, A Division of Metals Disintegrating Company 7
Putman Publishing Company 190, 198, 204, 208

R

Raybestos-Manhattan, Inc., Manhattan Rubber Division 111
Raybestos-Manhattan, Inc., Plastic Products Division 186
Raymond Bag Corporation, A Division of Albermarle Paper Mfg. Co. 34
Raymond Division, Combustion Engineering, Inc. 92
Renneburg & Sons Co., Edw. 202
Resistoflex Corporation 116-117
Revere Copper and Brass Incorporated 87
Rheem 43
Robinson Pneumatic Conveyor System, A Div. of Morse Boulger, Inc. 61
Rockwell Co., W. S. 168
Rohm & Haas Company 82
Rohm & Haas Company, The Resinous Products Division 70
Ross & Son Company, Inc., Charles 207

S

Sauereisen Cements Co. 96
Scam Instrument Corp. 205
Selas Corporation of America 182
Sethco Manufacturing Corp. 114
Sharples Corporation, The 162
Shriver & Co., Inc., T. 186
Simpson Mix-Muller Division, National Engineering Company 167
Sindar Corporation 76
Smith Corporation, A. O., Harvestore Products 52
Snap-Tite 137
Sparkler Manufacturing Company 166
Special Screw Products Company, The 114
Sperry & Company, D. R. 153
Spray Engineering Co. 84
Sprout-Waldron 188

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★ Exclusive Helicoid movement has no gears, no teeth. Shock-proof construction protects accuracy through millions of cycles.
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★ External pointer adjustment can't be jarred out of position.
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HELICOID GAGES
Helicoid Gage Division
American Chain & Cable Company, Inc.
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ACCO

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PISTON PACKING PROBLEMS SIMPLIFIED!

Conventional and 45° bevel type Pumcups.

● The *right* piston packing for reciprocating pumps and cylinders goes a long way toward eliminating the problems of slippage, maintenance and down-time.

Because Darcova Pumcups are made in a complete range of sizes, various types, and in many texture-engineered compositions, they *fit* your temperature-pressure-fluid conditions. That's one important reason why they usually outlast other packing at least 3 to 1 while holding top efficiency to the last!

Why not get *all* the facts? Send today for Bulletin No. 5903.

DARLING VALVE & MANUFACTURING CO.
Williamsport 4, Pa.

DARCOVA THE ORIGINAL COMPOSITION CUP
TRADE MARK
PUMCUPS

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SEALLESS PLASTIC PUMPS

TO HANDLE CORROSIVES, ABRASIVE SLURRIES AND GASES . . .

Vanton self-priming, non-agitating, Flex-i-liner pumps have no troublesome shaft seals, stuffing boxes, gaskets or check valves; they do not leak or contaminate; have a longer pump life and require little maintenance under even the most exacting process applications.

There are plastic pump, body and liner combinations, e.g. Teflon, PVC, Neoprene, Viton A — 54 to be exact — to resist virtually all chemical corrosives and their combinations.

These unique and versatile pumps are designed to meet most process operation needs and are available in capacities from ⅓ to 40 GPM with discharge pressures to 60 PSI and with temperature range of from −60°F to +400°F. WRITE FOR FREE CATALOG AND SPECIFICATIONS INFORMATION.

Vanton PUMP & EQUIPMENT CORP.
DIVISION OF COOPER ALLOY CORP., HILLSIDE, N. J.

Check 2441 opposite last page.

Square D Company, EC&M Division 147
Stainless and Strip Division, Jones & Laughlin Steel Corporation 13
Strahman Valves, Inc. 194
Sturtevant Co., P. A. 102
Sturtevant Mill Co. 200
Swartwout Division, Crane Co. 150
Swenson Evaporator Company, A Division of Whiting Corporation 14
Syntron Company 194

T

Taylor Instrument Companies 134-135
Technical Sales Corporation 129
Thermo Electric Co., Inc. 138
Thermovac, Inc., A Subsidiary of Rheem Manufacturing Co. 105
Toledo Scale, Division of Toledo Scale Corporation 208
Tote System, Inc. 51
Toteline 191
Towmotor Corporation 41
Traylor Engineering & Manufacturing Division of Fuller Company 149
Trent, Inc. 154
Tube Turns Plastics, Inc. 192
Turbocraft, Inc. 197
Turbo-Mixers, General American Transportation Corporation, Process Equipment Division ..... 3rd Cover
Tyler Company, The W. S. 83

U

Union Asbestos and Rubber Company, Fibrous Products Division 104
Union Carbide Corporation, Silicones Division 184
U. S. Hoffman Machinery Corp., Air Appliance Division 185
U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation ..... 74 A-B
U. S. Stoneware, Plastics & Synthetics Division 120
United States Rubber, Transportation Products Dept. 58
Universal Road Machinery Co., Rubert M. Gay Division 192

V

Valvair Corporation, Division of International Basic Economy Corporation 191
Vanadium Corporation of America 86
Vanton Pump & Equipment Corp., Division of Cooper Alloy Corporation 176, 182, 209
Vapor Heating Corporation 175
Vapor Recovery Systems Company, The 142
Viking Pump Company 196
Vogt Machine Co., Henry 94

W

Wall Colmonoy Corporation 126
Webster Manufacturing, Inc. 37
Weighing & Control Components, Inc., Division of CompuDyne Corp. 203
Wendnagel & Co., Inc. 102
Western Precipitation, Division of Joy Manufacturing Company 201
Weston Instruments Division, Daystrom Inc. 195
Wheelabrator Corp. 86
Wheeler Mfg. Co., C. H., Process Equipment Division 199
Whiting Corporation, Swenson Evaporator Company Division 14
Wiegand Company, Edwin L. 156
Worcester Valve Co., Inc. 121
Worklon, Inc. 16

Y

Yarnall-Waring Co. 136
Yeomans Brothers Company 77

FOR THE BIG SHAKE*

"World's Quietest Vibrators"

hopper cars
massive bunkers
large bins
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chutes
shake-outs

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sand
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coal
ore
other materials

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VIBRATION INDUCERS

*VIBROLATOR CCVP-3000, the 6600-lb. impact vibrator — or one of its three smaller brothers — IS GUARANTEED TO DO YOUR JOB OR YOUR MONEY BACK.

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MARTIN ENGINEERING COMPANY

Largest Producer of Rotary Vibrators

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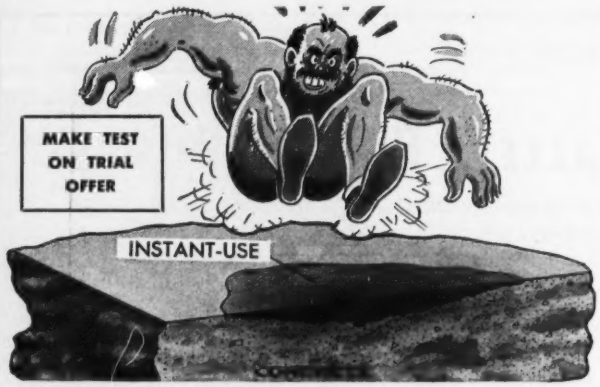

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Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut — tamp smooth — truck over! No waiting! INSTANT-USE bonds tight to old concrete — right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

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INSTANT-USE

FLEXROCK COMPANY (Offices in principal cities)
3611 Filbert St., Philadelphia 1, Pa.

Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and Free INSTANT-USE BROCHURE—no obligation. (Clip and attach Coupon to company letterhead).

Name .....
Title .....
Company .....
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"liquid materials handling"® equipment

BLACKMER / rotary pumps

BLACKMER PUMP COMPANY, GRAND RAPIDS 9, MICHIGAN

Find your Blackmer Man under "Pumps" in the Yellow Pages

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...with LAMPORTS JOB ENGINEERING

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MAY 1960

☐ 1756*	☐ 1809	☐ 1862	☐ 1959	☐ 2012*	☐ 2086
☐ 1757	☐ 1810	☐ 1907	☐ 1960	☐ 2013	☐ 2087
☐ 1758	☐ 1811	☐ 1908	☐ 1961	☐ 2014	☐ 2088
☐ 1759	☐ 1812	☐ 1909*	☐ 1962	☐ 2015	☐ 2089
☐ 1760	☐ 1813	☐ 1910	☐ 1963	☐ 2016	☐ 2090
☐ 1761	☐ 1814	☐ 1911*	☐ 1964	☐ 2017	☐ 2091
☐ 1762	☐ 1815	☐ 1912*	☐ 1965	☐ 2018	☐ 2092
☐ 1763	☐ 1816	☐ 1913	☐ 1966	☐ 2019	☐ 2093
☐ 1764*	☐ 1817	☐ 1914	☐ 1967	☐ 2020	☐ 2094
☐ 1765	☐ 1818	☐ 1915	☐ 1968	☐ 2021	☐ 2095
☐ 1766	☐ 1819	☐ 1916	☐ 1969	☐ 2022	☐ 2096
☐ 1767	☐ 1820	☐ 1917	☐ 1970	☐ 2023	☐ 2097
☐ 1768	☐ 1821	☐ 1918	☐ 1971	☐ 2024	☐ 2098
☐ 1769	☐ 1822	☐ 1919	☐ 1972	☐ 2025	☐ 2099
☐ 1770	☐ 1823	☐ 1920	☐ 1973	☐ 2026	☐ 2100
☐ 1771	☐ 1824	☐ 1921*	☐ 1974	☐ 2027	☐ 2101
☐ 1772	☐ 1825	☐ 1922	☐ 1975	☐ 2028	☐ 2102*
☐ 1773	☐ 1826	☐ 1923	☐ 1976	☐ 2029	☐ 2103
☐ 1774	☐ 1827	☐ 1924	☐ 1977	☐ 2030	☐ 2104
☐ 1775	☐ 1828	☐ 1925	☐ 1978	☐ 2031	☐ 2105
☐ 1776	☐ 1829	☐ 1926	☐ 1979	☐ 2032	☐ 2106
☐ 1777	☐ 1830	☐ 1927	☐ 1980	☐ 2033	☐ 2107
☐ 1778	☐ 1831	☐ 1928	☐ 1981	☐ 2034	☐ 2108
☐ 1779	☐ 1832	☐ 1929	☐ 1982	☐ 2035	☐ 2109*
☐ 1780	☐ 1833	☐ 1930	☐ 1983	☐ 2057	☐ 2110
☐ 1781	☐ 1834	☐ 1931	☐ 1984	☐ 2058*	☐ 2111
☐ 1782	☐ 1835	☐ 1932	☐ 1985*	☐ 2059	☐ 2112
☐ 1783	☐ 1836	☐ 1933*	☐ 1986	☐ 2060	☐ 2113
☐ 1784*	☐ 1837	☐ 1934	☐ 1987	☐ 2061	☐ 2114
☐ 1785	☐ 1838	☐ 1935	☐ 1988	☐ 2062	☐ 2115
☐ 1786	☐ 1839	☐ 1936	☐ 1989	☐ 2063	☐ 2116
☐ 1787	☐ 1840*	☐ 1937	☐ 1990	☐ 2064	☐ 2117
☐ 1788	☐ 1841	☐ 1938	☐ 1991	☐ 2065	☐ 2118
☐ 1789	☐ 1842	☐ 1939	☐ 1992	☐ 2066*	☐ 2119
☐ 1790*	☐ 1843	☐ 1940	☐ 1993	☐ 2067	☐ 2120*
☐ 1791	☐ 1844	☐ 1941	☐ 1994	☐ 2068	☐ 2121
☐ 1792	☐ 1845	☐ 1942	☐ 1995	☐ 2069	☐ 2122
☐ 1793	☐ 1846	☐ 1943	☐ 1996	☐ 2070	☐ 2123
☐ 1794	☐ 1847	☐ 1944	☐ 1997*	☐ 2071	☐ 2124
☐ 1795	☐ 1848	☐ 1945	☐ 1998	☐ 2072	☐ 2125
☐ 1796	☐ 1849	☐ 1946	☐ 1999	☐ 2073	☐ 2126
☐ 1797	☐ 1850	☐ 1947	☐ 2000	☐ 2074	☐ 2127
☐ 1798	☐ 1851	☐ 1948	☐ 2001	☐ 2075	☐ 2128
☐ 1799	☐ 1852*	☐ 1949	☐ 2002	☐ 2076	☐ 2129
☐ 1800	☐ 1853	☐ 1950	☐ 2003	☐ 2077	☐ 2130
☐ 1801	☐ 1854	☐ 1951	☐ 2004	☐ 2078	☐ 2131
☐ 1802	☐ 1855	☐ 1952	☐ 2005	☐ 2079	☐ 2132
☐ 1803	☐ 1856*	☐ 1953	☐ 2006	☐ 2080	☐ 2133*
☐ 1804	☐ 1857	☐ 1954	☐ 2007	☐ 2081	☐ 2134*
☐ 1805	☐ 1858	☐ 1955	☐ 2008	☐ 2082	☐ 2135
☐ 1806	☐ 1859	☐ 1956	☐ 2009	☐ 2083	☐ 2136
☐ 1807	☐ 1860	☐ 1957	☐ 2010	☐ 2084	☐ 2137
☐ 1808	☐ 1861	☐ 1958	☐ 2011	☐ 2085	☐ 2138

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Key No.	Description

READER SERVICE SLIP Continued from reverse side of this sheet **MAY 1960**

☐ 2139	☐ 2191	☐ 2243	☐ 2295	☐ 2347	☐ 2399
☐ 2140	☐ 2192	☐ 2244	☐ 2296	☐ 2348	☐ 2400
☐ 2141	☐ 2193	☐ 2245	☐ 2297*	☐ 2349	☐ 2401
☐ 2142	☐ 2194	☐ 2246	☐ 2298*	☐ 2350	☐ 2402
☐ 2143	☐ 2195	☐ 2247	☐ 2299*	☐ 2351	☐ 2403
☐ 2144	☐ 2196	☐ 2248	☐ 2300	☐ 2352	☐ 2404
☐ 2145	☐ 2197	☐ 2249	☐ 2301*	☐ 2353	☐ 2405
☐ 2146	☐ 2198	☐ 2250	☐ 2302*	☐ 2354	☐ 2406
☐ 2147	☐ 2199	☐ 2251	☐ 2303	☐ 2355	☐ 2407
☐ 2148	☐ 2200	☐ 2252	☐ 2304	☐ 2356	☐ 2408
☐ 2149	☐ 2201	☐ 2253	☐ 2305	☐ 2357*	☐ 2409
☐ 2150	☐ 2202*	☐ 2254	☐ 2306	☐ 2358	☐ 2410
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☐ 2154	☐ 2206*	☐ 2258	☐ 2310	☐ 2362	☐ 2414
☐ 2155	☐ 2207	☐ 2259	☐ 2311	☐ 2363*	☐ 2415
☐ 2156	☐ 2208	☐ 2260	☐ 2312	☐ 2364	☐ 2416
☐ 2157	☐ 2209	☐ 2261	☐ 2313	☐ 2365	☐ 2417*
☐ 2158	☐ 2210	☐ 2262	☐ 2314	☐ 2366	☐ 2418*
☐ 2159	☐ 2211	☐ 2263	☐ 2315	☐ 2367	☐ 2419*
☐ 2160	☐ 2212	☐ 2264	☐ 2316	☐ 2368	☐ 2420
☐ 2161	☐ 2213	☐ 2265*	☐ 2317	☐ 2369	☐ 2421*
☐ 2162	☐ 2214	☐ 2266	☐ 2318	☐ 2370	☐ 2422
☐ 2163	☐ 2215	☐ 2267	☐ 2319	☐ 2371	☐ 2423
☐ 2164	☐ 2216	☐ 2268	☐ 2320	☐ 2372	☐ 2424
☐ 2165	☐ 2217	☐ 2269	☐ 2321	☐ 2373	☐ 2425
☐ 2166	☐ 2218	☐ 2270	☐ 2322	☐ 2374	☐ 2426
☐ 2167	☐ 2219	☐ 2271	☐ 2323	☐ 2375	☐ 2427
☐ 2168	☐ 2220	☐ 2272	☐ 2324	☐ 2376	☐ 2428
☐ 2169	☐ 2221*	☐ 2273	☐ 2325	☐ 2377	☐ 2429
☐ 2170	☐ 2222	☐ 2274	☐ 2326	☐ 2378	☐ 2430
☐ 2171	☐ 2223	☐ 2275	☐ 2327	☐ 2379	☐ 2431
☐ 2172	☐ 2224	☐ 2276	☐ 2328	☐ 2380	☐ 2432
☐ 2173	☐ 2225	☐ 2277*	☐ 2329	☐ 2381	☐ 2433
☐ 2174	☐ 2226	☐ 2278	☐ 2330	☐ 2382	☐ 2434
☐ 2175	☐ 2227	☐ 2279	☐ 2331	☐ 2383	☐ 2435
☐ 2176	☐ 2228	☐ 2280	☐ 2332*	☐ 2384*	☐ 2436*
☐ 2177	☐ 2229	☐ 2281*	☐ 2333	☐ 2385*	☐ 2437
☐ 2178	☐ 2230	☐ 2282	☐ 2334	☐ 2386	☐ 2438*
☐ 2179	☐ 2231	☐ 2283	☐ 2335	☐ 2387	☐ 2439
☐ 2180	☐ 2232	☐ 2284	☐ 2336	☐ 2388	☐ 2440
☐ 2181	☐ 2233	☐ 2285	☐ 2337	☐ 2389*	☐ 2441
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☐ 2183	☐ 2235	☐ 2287	☐ 2339	☐ 2391	☐ 2443
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☐ 2185	☐ 2237	☐ 2289	☐ 2341*	☐ 2393	☐ 2445
☐ 2186	☐ 2238	☐ 2290	☐ 2342	☐ 2394	☐ 2446
☐ 2187	☐ 2239	☐ 2291	☐ 2343	☐ 2395	☐ 2447
☐ 2188	☐ 2240	☐ 2292	☐ 2344	☐ 2396	☐ 2448*
☐ 2189	☐ 2241	☐ 2293	☐ 2345	☐ 2397	
☐ 2190	☐ 2242	☐ 2294	☐ 2346	☐ 2398*	

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(This request form expires July 5, 1960)

Use this space for writing in specific literature or product designation when you check a number with an asterisk (*) in accompanying list. Repeat the key number from that list, and follow it with specific bulletin number (or title), or product name, as it appears in article or advertisement. PLEASE TYPE OR PRINT.

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that's interesting

Dig a hole and spray to get swimming pool

Dig a hole in the backyard, spray the sides and bottom with a "gun" which shoots glass fiber, and you have a swimming pool. That is one of applications proposed by Spray-Bilt, Inc., manufacturer of this spray gun.

With gun, two resin mixes are kept in separate containers until an instant before they are combined and meet glass. Separated, mixes are workable for three to four days. Mixed during spraying, their gel-time drops to minutes or even seconds.

Other applications suggested include reinforcing pipe, repairing tanks, constructing molds, making safety guards for machinery.

Synthetic rubber tube is biggest dock fender

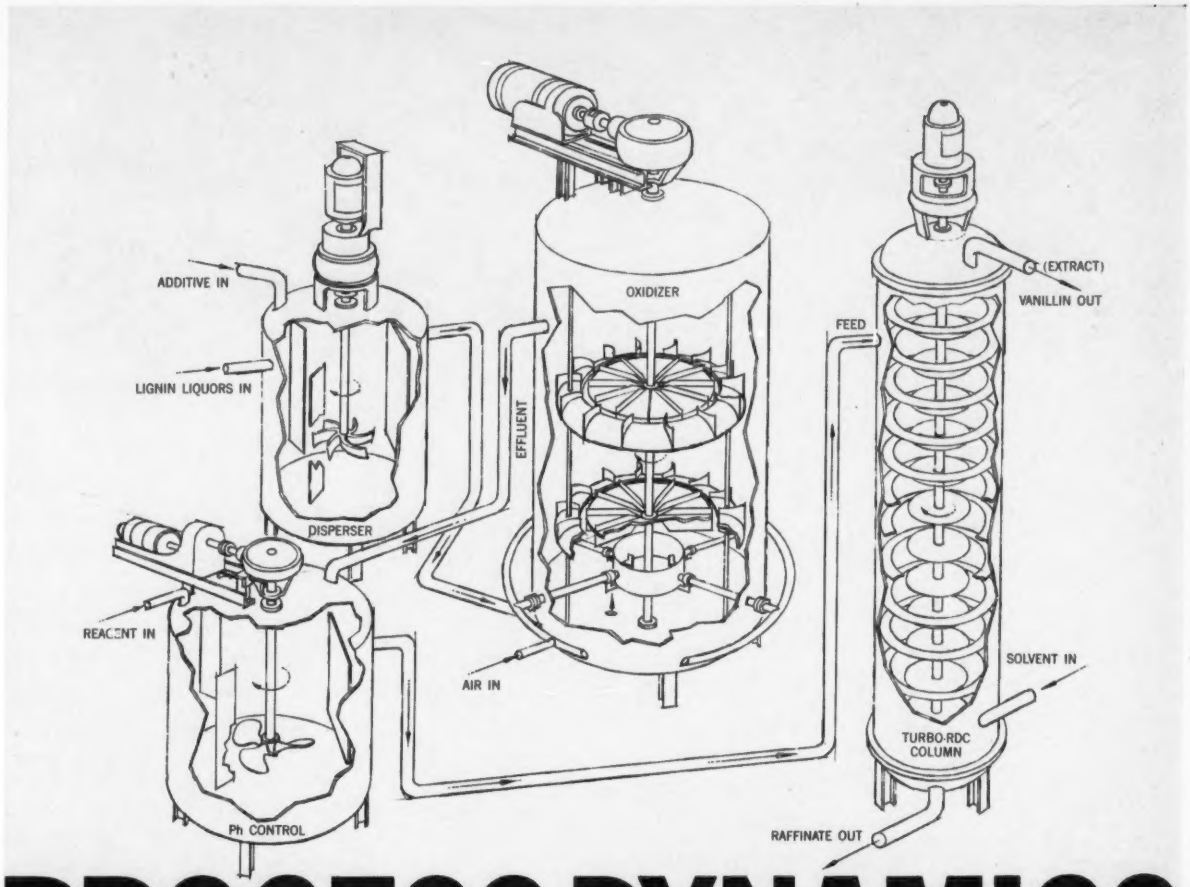
Synthetic rubber tube with 21" OD and capable of withstanding impacts of nearly 100,000 lb/ft is being heralded as biggest dock fender. Fender is expected to virtually eliminate damage caused by "docking" ships. It was manufactured by Goodyear Tire & Rubber Company.

Patent searching time cut with computer

A patent-searching job which requires a full day of skilled researcher's time may be accomplished in 30 minutes with electronic computer techniques.

G-15 digital computer, manufactured by Bendix Aviation Corporation's Computer Division, is being used in experiment involving huge mass of patent data covering chemical compounds that form basis for many commonly used plastics.

Patent agency's punched-card file was adapted to G-15 by Government researchers working with Research Division, Textile Fibers Department of E. I. du Pont de Nemours & Co., Inc.



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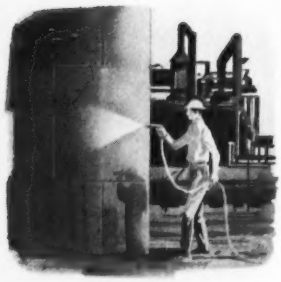
Check 2446 opposite last page.

AMERCOAT: COMPLETE CORROSION PROTECTION

No one coating is ideal for all applications. A coating which gives outstanding protection against strong alkalies may fail completely when exposed to acids or severe weathering.

In order to provide complete corrosion protection, the Amercoat Corporation manufactures more than 40 completely different products, each formulated to give maximum corrosion protection for specific applications. As new processes and techniques alter exposures and requirements, Amercoat's continuing research develops new products to meet those requirements. Also, advanced research and testing upgrades and improves existing products to maintain maximum protection and enduring, maintenance-free life. Amercoat protective coatings, ranging from vinyls to epoxies to phenolics, are tailor-made for long-range protection and economy in tough applications.



BONDSTRAND—A corrosion resistant, high strength, glass reinforced epoxy pipe.
Typical applications: Acid lines, waste process water, ducting for air or fumes, process lines.

DIMETCOTE—100% inorganic, zinc silicate coating
Typical applications: Tank exteriors, structural steel, cooling towers, and as a permanent primer.

AMERCOAT No. 86—A synthetic resin primer especially formulated for exceptional adhesion and compatibility with various surfaces. Can be overcoated with vinyl or epoxy coatings.

AMERCOAT No. 33—Vinyl maintenance coating unexcelled for water immersion, chemical spillage or corrosive fumes.
Typical applications: Plating tanks, tank car exteriors, structural steel, caustic tanks, tank exteriors.

AMERCOAT No. 66—A high build epoxy for tank lining or exterior maintenance coating.
Typical applications: Brine tanks, structural steel in processing areas.

AMERCOAT No. 78—An easily applied coal tar epoxy which provides exceptional resistance to water and a wide range of chemicals.

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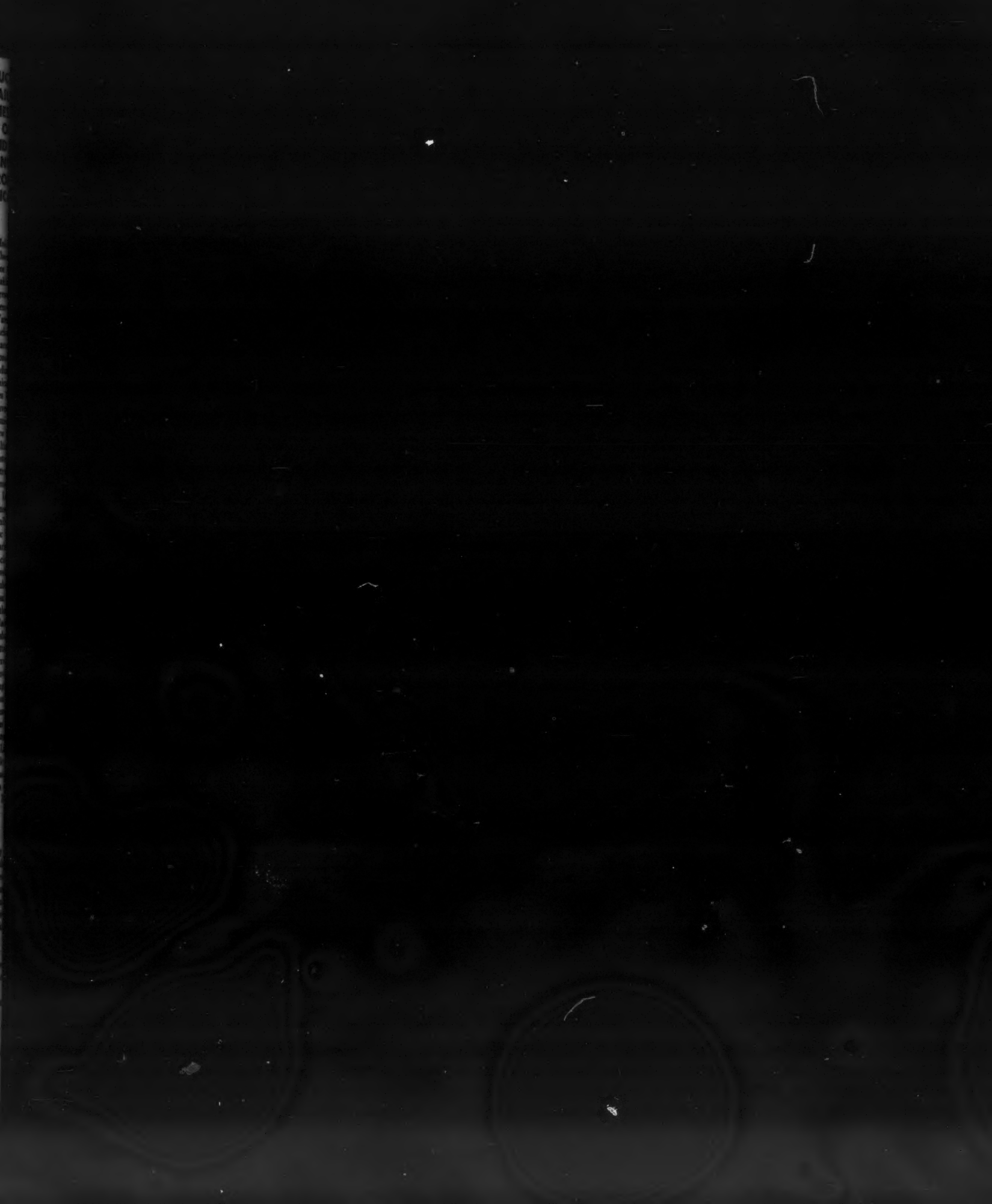
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